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# Compilation of Air Pollutant Emission Factors Volume 2. Mobile Sources (4th Edition)

(U.S.) Environmental Protection Agency
Ann Arbor, MI

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United States
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Air

Motor Vehicle Emission Laboratory
2565 Plymouth Road
Ann Arbor, MI 48105

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Fourth Edition
September 1985

EPA

# COMPILATION OF AIR POLLUTANT EMISSION FACTORS

## Volume II:
## Mobile Sources

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The document officially revises all previous factor (AP-42) documents for highway mobile sources. Also, the document will be periodically revised as the emissions and in-use vehicle operational characteristics vary from those presented. The document was generated to present more recent emission factor information for highway mobile sources. As such, the March 1981 Compilation of Air Pollutant Emission Factors: Highway Mobile Sources, EPA-460/3-81-005 document is outdated. Many of the emission rates contained in the document are found in EPA's mobile source emission model, MOBILE3. The differences between the emission factors presented in the document and the March, 1981, Compilation Document are listed.

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September 1985

# COMPILATION OF AIR POLLUTANT EMISSION FACTORS

## Volume II: Mobile Sources

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Radiation
Office of Mobile Sources
Test and Evaluation Branch
Ann Arbor, MI 48105

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This report has been reviewed by the Office of Mobile Sources, U.S. Environmental Protection Agency, and has been approved for publication. Mention of trade names or commercial products is not intended to constitute endorsement or recommendation for use.

Volume II

# PREFACE TO THE FOURTH EDITION

## VOLUME II: MOBILE SOURCES

Compilation of Air Pollutant Emission Factors, AP-42, reports data on emissions of atmospheric polutants for which sufficient information exists to establish realistic emission factors. The highway source data are based on MOBILE3, a computer program issued by the EPA in June 1984, which estimates fleet emission rates for hydrocarbons (HC), carbon monoxide (CO) and nitrous oxides (NOx) for any calendar year. One off-highway source has been updated from previous editions of AP-42. The off-highway source updated is diesel powered construction equipment.

For the Fourth Edition, stationary point and area sources have been collected as Volume I. Mobile sources, formerly Chapter 3.0, are now separated into Volume II. Comments and suggestions regarding this document are appreciated and should be addressed to the AP-42 Project, Test and Evaluation Branch, Environmental Protection Agency, 2565 Plymouth Road, Ann Arbor, MI 48105.

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## Part I - HIGHWAY MOBILE SOURCES

## INTRODUCTION

This document officially revises all previous factor (AP-42) documents for highway mobile sources. Also, this document will be periodically revised as the emissions and in-use vehicle operational characteristics vary from those presented.

### A. PURPOSE

This document was generated to present more recent emission factor information for highway mobile sources. As such, the March 1981 Compilation of Air Pollutant Emission Factors: Highway Mobile Sources, EPA-460/3-81-005 document is outdated. Many of the emission rates contained in this document are found in EPA's mobile source emission model, MOBILE3.

### B. MAJOR DIFFERENCES FROM 1981 COMPILATION DOCUMENT [1]

The differences between the emission factors presented in this document and the March, 1981, Compilation Document are listed below:

1. Calculation Methodologies

   a. CO emissions at cold temperatures are predicted in part from an additive rather than a multiplicative model.

   b. Tampering offsets in g/mi are estimated from a number of inputs and added to basic untampered emission rates for the gasoline vehicle classes. The types of tampering included are misfueling (other than filler neck disablement), fuel inlet disablement, catalyst removal, EGR tampering, evaporative canister and PCV tampering, and air pump tampering. National average tampering rates for the above items are incorporated into the fleet emission rates.

   c. The heavy duty diesel mileage vs. age distribution is allowed to change with calendar year to account for the effects of more diesel sales in the light 2b (8,500-10,000 lb. GVW) class.

   d. Nonmethane emissions are estimated from a subtractive rather than a multiplicative model.

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2. Emission Data

   a. The evaporative emission rates are based on a representative volatility commercial fuel instead of Indolene, a low volatility test fuel.

   b. More data for basic exhaust emissions for every vehicle type are incorporated, usually for the latest model years and across wider mileage ranges. This is especially true for the 1981 and later light duty gasoline vehicles.

   c. More representative fleet characterization data (registration and VMT vs. age distributions) are used for each vehicle type.

   d. The heavy duty vehicle emissions are based in part on new estimates of the factors which are used to convert emissions in g/bhp-hr to g/mi. These estimates are allowed to change in the future due to improved fuel economy of new trucks and increased sales in the lower weight classes.

   e. More temperature correction factor data have been incorporated for light-duty gasoline vehicles and trucks.

   f. More speed correction factor data have been incorporated for light duty gasoline vehicles and trucks.

3. Regulations

   The emission rates for the 1981 and later model year vehicles reflect the emission standards and regulations that are projected at the time of this update (see Appendix A).

In summary, all of the changes have an impact on the calculated emission factors. To illustrate the differences, six figures are given. Each figure represents emissions at an average speed of 19.6 mph, a temperature of 75°F, and operating mode VMT percentages of 20.6% for cold start, 52.1% for stabilized, and 27.3% for hot start. The six figures are grouped into two sets: 1) low altitude, and 2) high altitude emissions for January 1 of calendar years 1970 through 2000. The figures represent the emission levels for all eight vehicle types combined. Each set of graphs is composed of the three pollutants: total HC, CO, and NOx. The emissions predicted by the 1981 Compilation methodology were generated by the MOBILE2 computer model. The emissions predicted by the 1984 AP-42 methodology were generated by the MOBILE3 computer model, as corrected on May 15, 1985. The update included corrections to temperature correction factors and the EGR tampering rate.

FIGURE 1

TOTAL HYDROCARBONS, ALL MOBILE SOURCES
1970 – 2000
Low Altitude

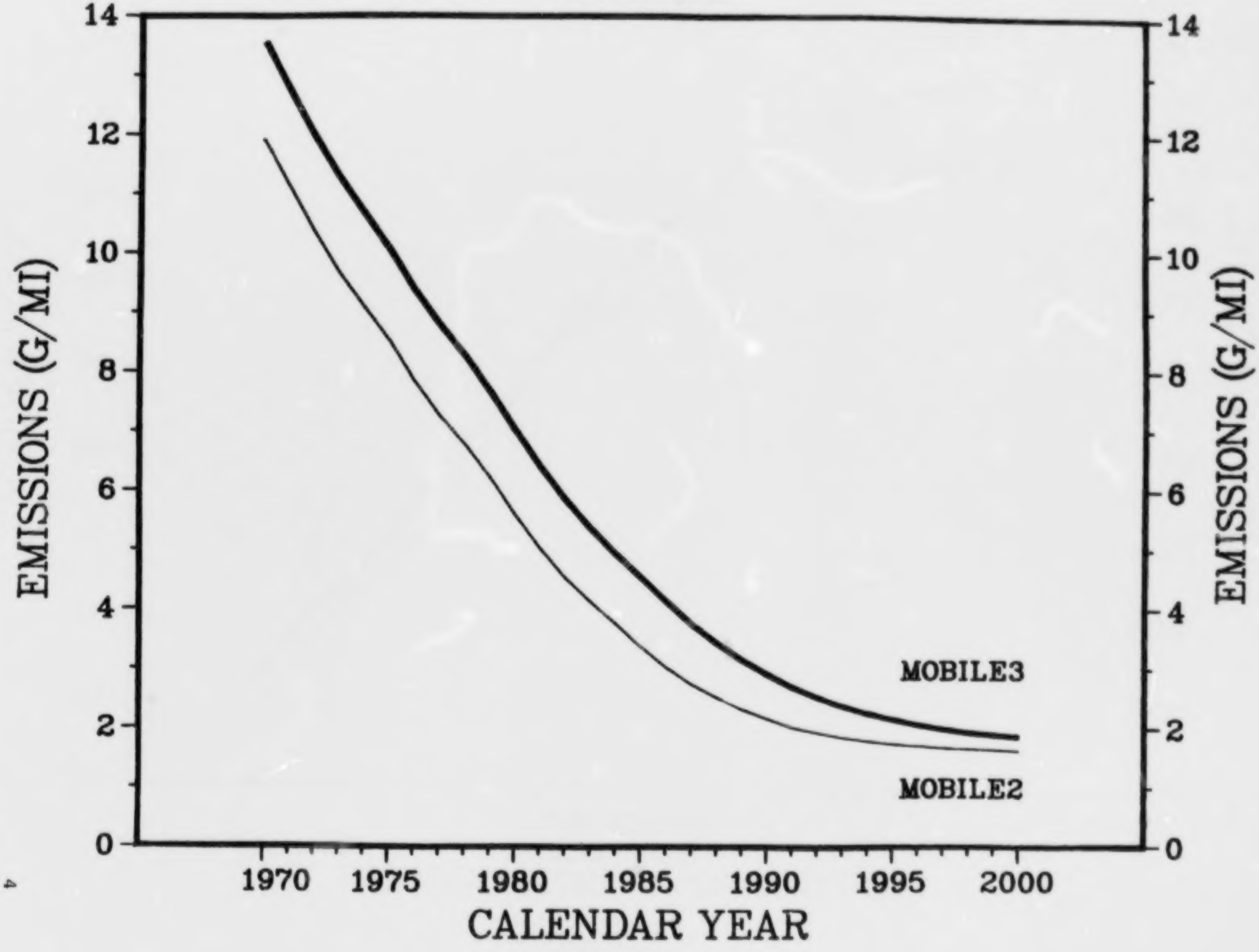


FIGURE 2

CARBON MONOXIDE, ALL MOBILE SOURCES
1970 – 2000
Low Altitude

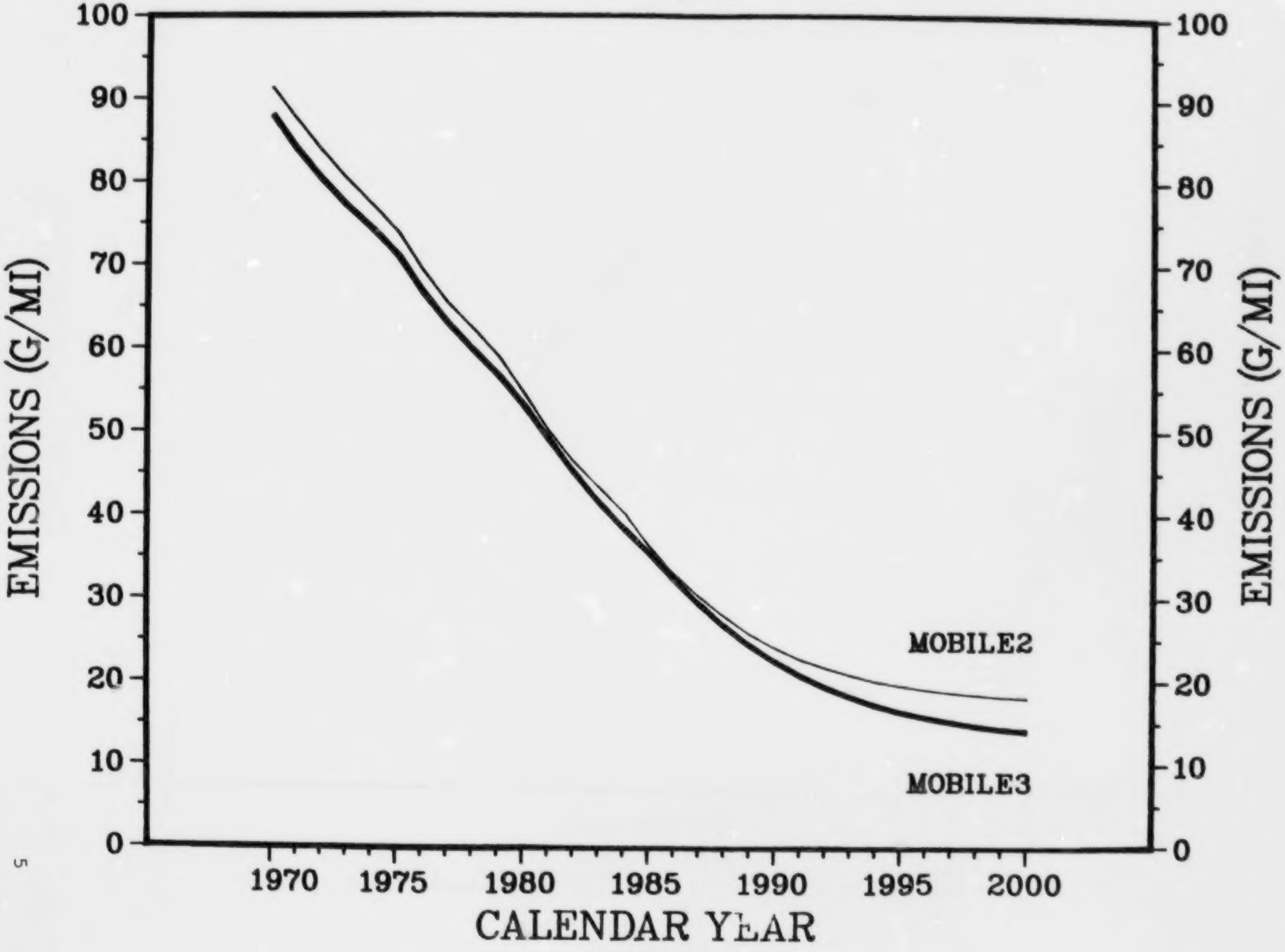


FIGURE 3

OXIDES OF NITROGEN, ALL MOBILE SOURCES
1970 – 2000
Low Altitude

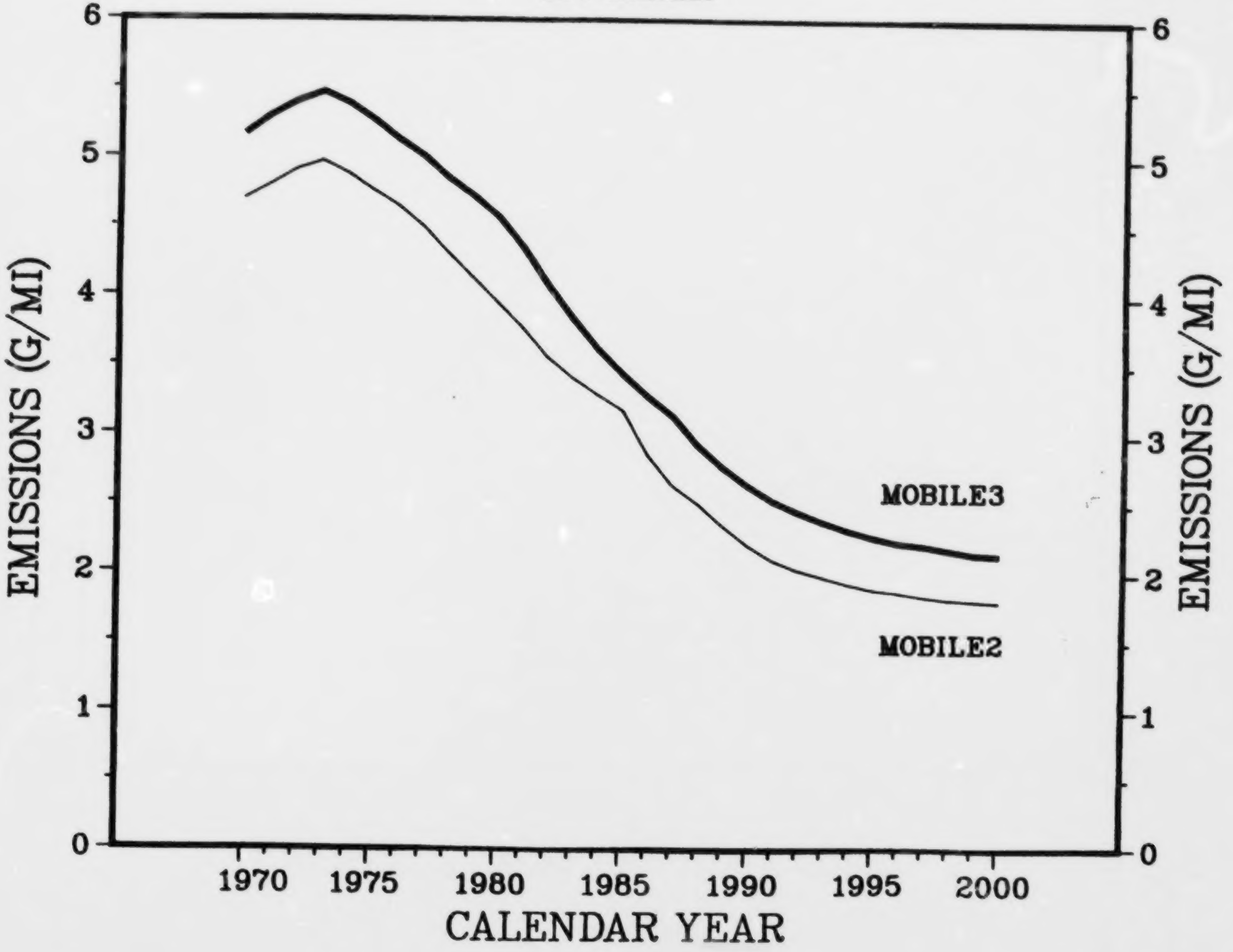


FIGURE 4

TOTAL HYDROCARBONS, ALL MOBILE SOURCES
1970 – 2000
High Altitude

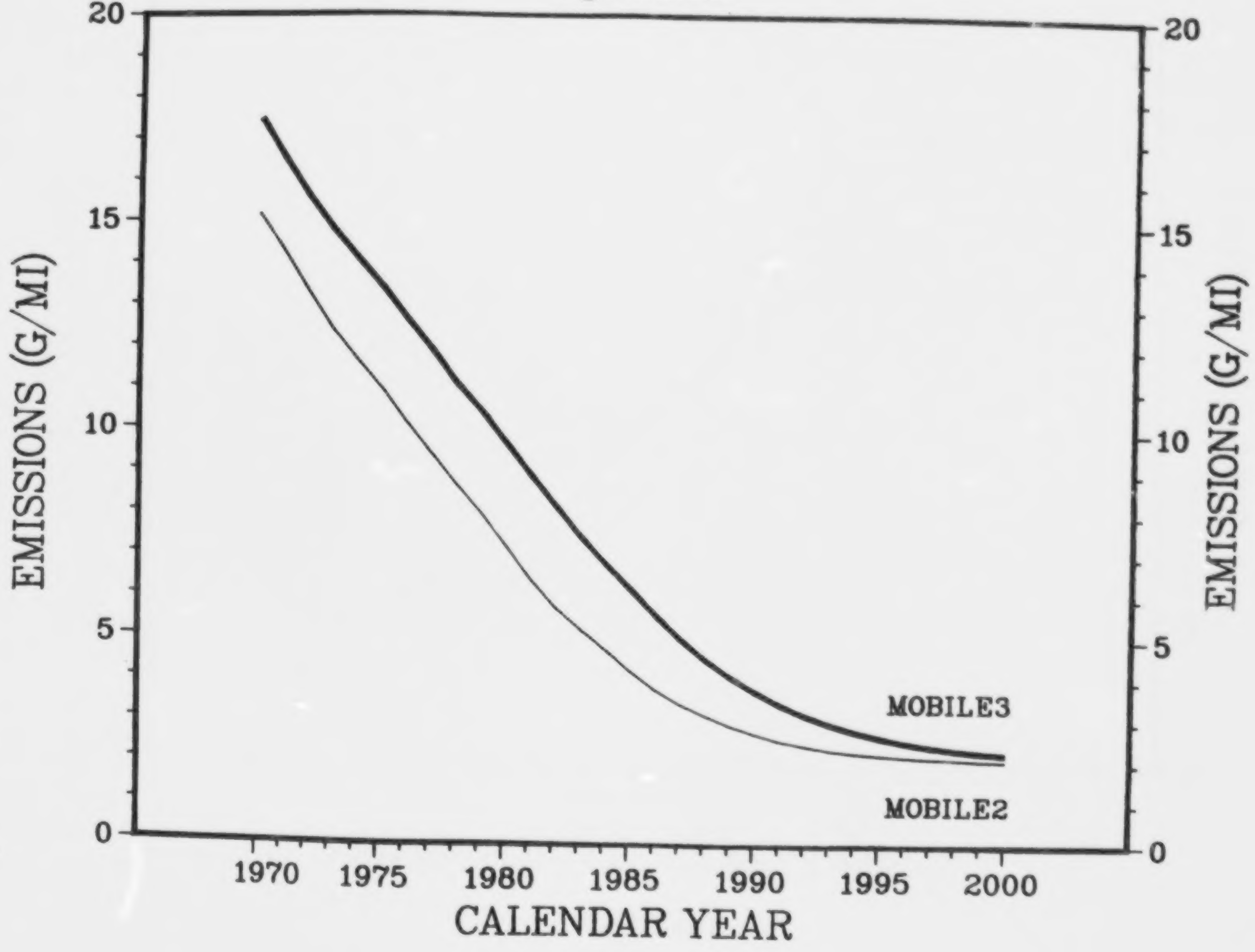
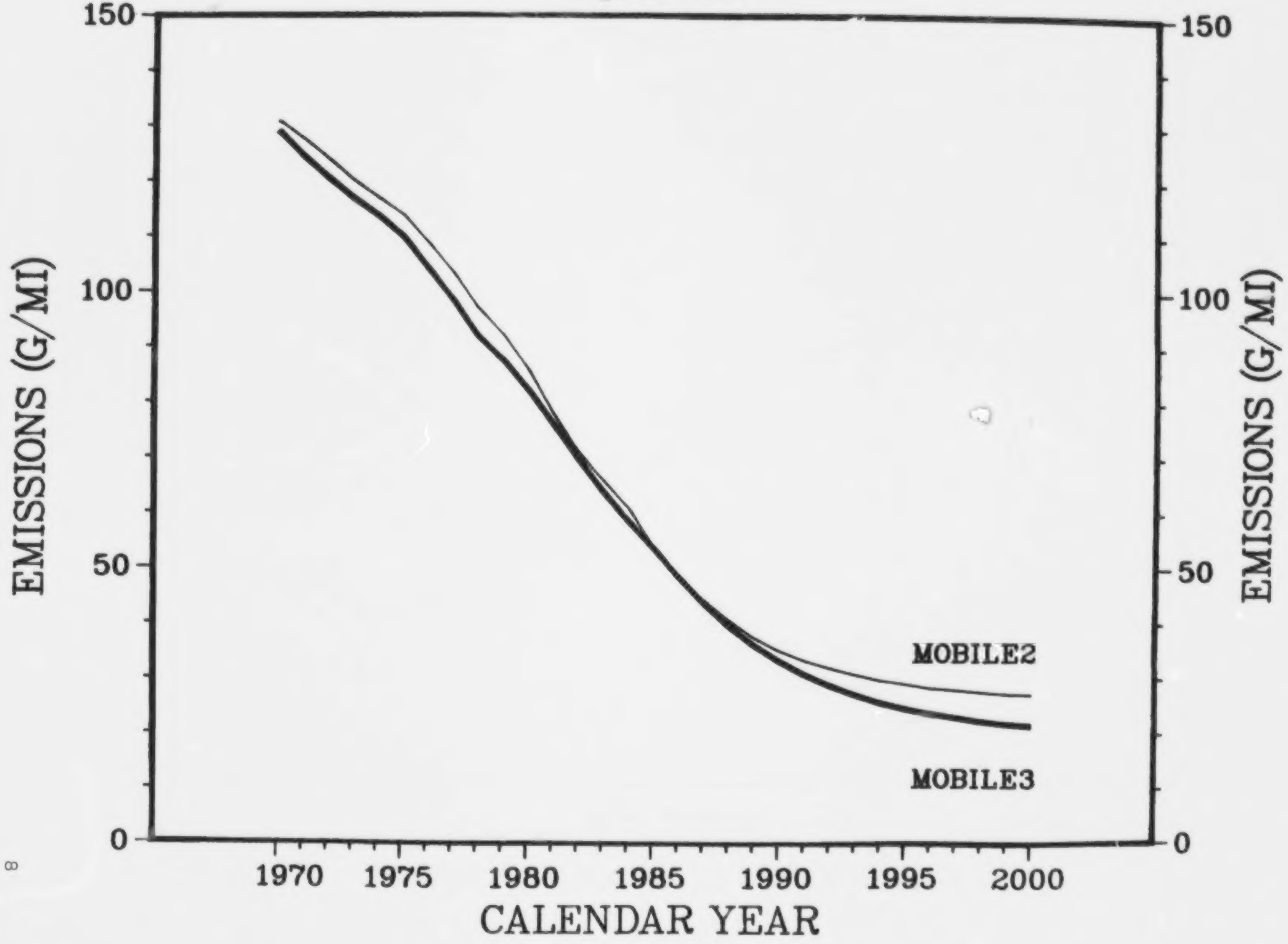


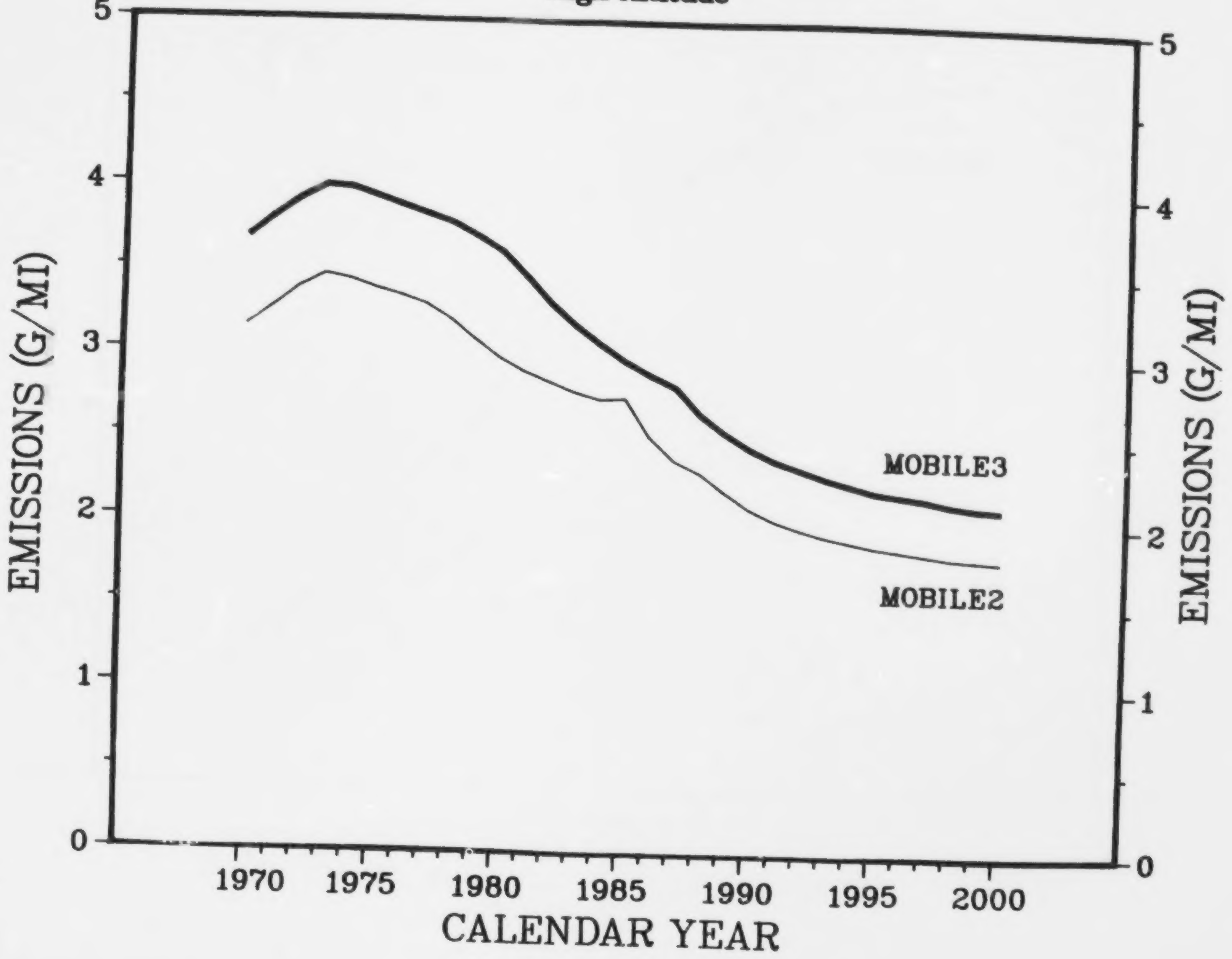
FIGURE 5

CARBON MONOXIDE, ALL MOBILE SOURCES
1970 – 2000
High Altitude



## FIGURE 6

OXIDES OF NITROGEN, ALL MOBILE SOURCES
1970 – 2000
High Altitude



## C. VEHICLE INSPECTION AND MAINTENANCE PROGRAMS

If a motor vehicle inspection and maintenance (I/M) program is in effect in the area for which emission factors are being calculated, emission reduction credits can be taken.

The emission reduction credits attributable to an annual I/M program vary according to the type of program in effect. The MOBILE3 credits of an I/M program depend upon the following six factors.

1. The estimated first year failure rate (stringency factor) for the pre-1981 low altitude LDGVs (or other vehicle types with similar emission control technologies). The pre-1975 vehicles are referred to as Technology I vehicles and 1975-1980 vehicles are referred to as Technology II vehicles.
2. The test type and short test cutpoints used for 1981 and later light duty gasoline vehicles.
3. The vehicle types affected by the I/M program: LDGV; LDGV & LDGT1; LDGV & LDGT2; or LDGV, LDGT1, & LDGT2.
4. The calendar year being analyzed and the calendar year the I/M program is implemented.
5. The presence or absence of an adequate mechanic's training program.
6. The model years involved in the I/M program.

These I/M reductions or credits are not tabulated in this document but can be applied through use of the MOBILE3 computer program.

## D. VEHICLE ANTI-TAMPERING PROGRAMS

Emission reduction credits can also be taken if an anti-tampering program is in effect in the area for which emission factors are being calculated.

The emission reduction credits attributable to an anti-tampering program vary according to the program type. The types of programs and percent reductions attributable to them are discussed in the December 31, 1983 technical report entitled "Anti-Tampering and Anti-Misfueling Programs to Reduce In-Use Emissions From Motor Vehicles", EPA-AA-TSS-83-10. The MOBILE3 credits of an anti-tampering program depend on the following:

1. The extent of the inspection (i.e., types of components inspected) and frequency of the check (annual, biennial, random road side, etc.).
2. The vehicle types affected: LDGV's, LDGT1's, LDGT2's and HDGV's.
3. The calendar year being analyzed and the calendar year in which the program is implemented.
4. The model years involved in the anti-tampering program.

These anti-tampering program credits are not tabulated in this document, but can be used with the MOBILE3 computer program.

## E. REACTIVE VERSUS NONREACTIVE HYDROCARBON EMISSIONS

Available scientific evidence indicates that methane and a few other nonreactive organic compounds do not contribute significantly to ozone formations. EPA's Volatile Organic Compound policy, published in the Federal Register on July 8, 1977, allows a limited number of compounds, including methane, to be excluded from control actions. States have been advised that they should exclude these compounds from baseline emission inventories that are to be used for control strategy development for ozone.

Although motor vehicles are regulated directly by the Clean Air Act on a total hydrocarbon basis (rather than on a "reactive" hydrocarbon basis), it is appropriate, when estimating ozone levels, to consider only those motor vehicle emissions which will react to form ozone. However, consideration must be given to the format of any associated stationary source emission inventory so that mobile source and stationary source emission inventories are consistent in their exclusions.

For MOBILE2 it was assumed that the methane percentage of total hydrocarbon emissions was constant over mileage. The analysis for MOBILE3, however, showed that there was practically no deterioration in methane like there was for total hydrocarbons. For MOBILE3, nonmethane emissions are estimated by subtracting methane offsets from the total hydrocarbon emissions. These offsets are constant. Estimates of the composite FTP methane offsets applicable to each vehicle category are given in the following table.

While the MOBILE3 computer program can calculate either total or nonmethane hydrocarbon emissions, all HC emission factors presented in this document are total hydrocarbons.

## FTP COMPOSITE METHANE OFFSETS FROM HIGHWAY MOBILE SOURCES

| Vehicle Type | Low Altitude Model Years | Methane Offset (g/mi) | High Altitude Model Years | Methane Offset (g/mi) |
|---|---|---|---|---|
| LDGV | Pre-1975 | 0.310 | Pre-1975 | 0.420 |
| | 1975-79 | 0.170 | 1975-76 | 0.320 |
| | 1981+ | 0.100 | 1977 | 0.150 |
| | | | 1978-79 | 0.330 |
| | | | 1980+ | 0.220 |
| LDGT1 | Pre-1975 | 0.310 | Pre-1975 | 0.420 |
| | 1975-78 | 0.200 | 1975-78 | 0.390 |
| | 1979-83 | 0.180 | 1979-83 | 0.350 |
| | 1984+ | 0.120 | 1984+ | 0.260 |
| LDGT2 | Pre-1979 | 0.310 | Pre-1974 | 0.420 |
| | 1979-83 | 0.180 | 1974-78 | 0.420 |
| | 1984+ | 0.120 | 1979-83 | 0.350 |
| | | | 1984+ | 0.260 |
| HDGV | Pre-1979 | 0.670 | Pre-1979 | 0.910 |
| | 1979-86 | 0.310 | 1979-86 | 0.600 |
| | 1987+ | 0.180 | 1987+ | 0.350 |
| LDDV | Pre-1975 | 0.043 | Pre-1975 | 0.099 |
| | 1975+ | 0.011 | 1975+ | 0.025 |
| LDDT | Pre-1979 | 0.038 | Pre-1979 | 0.079 |
| | 1979-82 | 0.034 | 1979-82 | 0.040 |
| | 1983+ | 0.024 | 1983+ | 0.022 |
| HDDV | Pre-1981 | 0.145 | Pre-1981 | 0.333 |
| | 1981-86 | 0.118 | 1981-86 | 0.271 |
| | 1987+ | 0.100 | 1987+ | 0.230 |
| MC | Pre-1978 | 0.530 | Pre-1978 | 0.680 |
| | 1978-79 | 0.270 | 1978-79 | 0.340 |
| | 1980+ | 0.240 | 1980+ | 0.370 |
| Crank-case & Evap. | All | 0.0 | All | 0.0 |

## Chapter 1

# LIGHT DUTY GASOLINE POWERED VEHICLES

## 1.A INTRODUCTION

Because of their widespread use, light duty gasoline powered vehicles (LDGV) are responsible for a large share of air pollutant emissions in many areas of the United States. A LDGV is defined to be any gasoline fueled automobiles designated primarily for transportation of persons and having a capacity of 12 persons or fewer. Substantial research effort has been expended to accurately characterize emission data from these vehicles. EPA's on-going program to collect in-use vehicle emissions data was instituted a number of years ago in order to estimate emission levels.

In addition to the methodologies presented for calculating the basic exhaust emission levels for HC, CO, and NOx, data are given in this chapter for crankcase and evaporative hydrocarbon emissions, and emissions in the idle mode. Information is also given regarding the emission correction factors and travel weighting fractions.

All tables referenced in Chapters 1-8 are found in Appendix H. The first half of Appendix H applies to low altitude, the latter half to high altitude.

### 1.A.1 Test Procedure

LDGV emissions testing is currently performed according to the procedures stipulated in the Federal Register (42 FR 32954, June 28, 1977) and the Code of Federal Regulations (40 CFR Part 86, Subpart B, July 1, 1984). The basic test conditions under which the LDGVs are tested are as follows:

1. Ambient temperature range is 68°F to 86°F.
2. Absolute humidity is adjusted to 75 grains of water per pound of dry air.
3. Average speed is 19.6 mph with 18% idle operation.
4. Average percent of vehicle-miles-traveled (VMT) in a cold start operation is 20.6%.
5. Average percent of VMT in a hot start operation is 27.3%.
6. Average percent of VMT in the stabilized operation is 52.1%.
7. Average trip length is 7.5 miles.

Additional elements regarding the test procedure that are reflected in the emission estimates are as follows:

1. Air conditioning not in use.
2. Car contains driver and passenger -- no additional passengers, luggage, etc.
3. Car is not pulling a trailer.

The test sequence for LDGVs is summarized below:

1. Determine the weight of the vehicle.
2. Determine the road-load (assuming level road, no curves, no wind) which is a function of weight and frontal area.
3. Precondition the vehicle (i.e., vehicle is briefly driven).
4. Place the vehicle in an ambient temperature environment between 68°F and 86°F with its engine off for at least 12 hours.
5. Push the vehicle onto a dynamometer.
6. Start the engine and begin collecting exhaust emissions.
7. Emissions for the first 505 seconds are collected for test segment #1. The mileage driven is 3.59 miles with an average speed of 26 mph. This is the cold start portion of the test.
8. Test segment #2 collects emissions for the next 870 seconds. The engine is not turned off between Steps 7 and 8. The mileage driven is 3.91 miles and the average speed is 16 mph. This is the stabilized portion of the test.
9. The engine is turned off.
10. The engine remains off for 10 minutes.
11. The car is restarted, the first 505 seconds are rerun, and emissions are collected for test segment #3. This is the hot start portion of the test.
12. The grams of each pollutant are determined for each test segment.
13. NOx emissions are adjusted for humidity.
14. The basic exhaust emission levels in grams per mile are computed.

### 1.A.2 General Emissions Calculation Equations

The following generalized equations are used to calculate the LDGV emission factors (subscripts dropped from equations for clarity):

a. HC: COMPEF = SUM[TF *(CCEVRT + SALHCF * BEF)]

where:
CCEVERT = [(HS+TAMEVP1)*TPD+(DI+TAMEVP2)]/MPD + (CC + TAMEVP3)
SALHCF = SCF * ACCF * XLCF * TWCF
BEF = OMTTAM - OFFMTH + OMTCF * BER

b. CO: COMPEF = SUM[TF * SALCHF * BEF]

SALHCF = SCF * ACCF * XLCF * TWCF

BEF = OMTTAM + OFFCO + OMTCF * BER

c. NOx: COMPEF = SUM [TF * SALHCF * BEF]

SALHCF = SCF * ACCF * XLCF * TWCF * HCF

BEF = OMTTAM + OMTCF * BER

And also where:

COMPEFpn = The basic exhaust emission factor for pollutant p in g/mile on January 1 of calendar year n.

SUMi = The summation over 20 model years of i=n -19 to i=n, where n is the calendar year.

TFin = The fraction of the total LDGV miles driven by model year i on January 1, of calendar year n.

CCEVRTin = The crankcase and evaporative HC emission factor for model year i in calendar year n.

SALHCFips = The composite speed, air conditioning, extra load and trailer towing correction factor for model year i, pollutant p and speed s.

BEFin = The basic exhaust emission rate for model year i in calendar year n.

HSi = The hot soak evaporative emission rate of model year i.

TAMEVP1in = The hot soak evaporative emission offset for model year i vehicles in calendar year n due to tampering.

TPD = The trips per day value for LDGV's.

DIi = The diurnal evaporative emission loss of model year i.

TAMEVP2in = The diurnal evaporative emission offset for model year i vehicles in calendar year n due to tampering.

MPD = Miles per day.

CCi = Crankcase emissions of model year i.

TAMEVP3in = The crankcase emission excess for model year i vehicles in calendar year n due to PCV tampering.

SCFips = The speed correction factor for model year i, pollutant p at speed s.

ACCFi = The air conditioning correction factor for model year i.

XLCFi = The extra load correction factor for model year i.

TWCFi = The trailer towing correction factor for model year i.

OMTTAMipn = The emissions offset for model year i pollutant p in calendar year n due to all types of tampering, corrected for temperature and operating mode.

OFFMTHi = The methane offset for model year i, used only if NMHC emissions are being estimated.

OMTCFi = The composite operating mode and temperature correction factor for model year i.

OFFCOt = The CO offset for Bag 1 at temperature t, corrected for operating mode.

HCF = The humidity correction factor for $NO_x$.

The general equations for estimating hot stabilized idle emissions are as follows:

IEFnp = SUMi[TFin*(IERinp-IDLMTHi)]

Where

IEFnp = The idle emission factor in g/minute for pollutant p in calendar year n.

IDLMTHi = The idle methane offset in g/minute for model year i, applicable only to HC emissions.

Tampering offsets are not added to idle emissions, furthermore, they are not corrected for temperature or operating mode.

## 1.B EMISSIONS

This section discusses the emission estimates for the LDGVs: Basic exhaust emission rates, tampering offsets, crankcase and evaporative HC emission levels, January 1 basic exhaust emission levels, and idle exhaust emission rates. The emission standards are given in Section A.1.1 of Appendix A. The emissions reflect vehicles which have received typical in-use maintenance. Further, the vehicles are not involved in an I/M or anti-tampering program.

### 1.B.1 Basic Exhaust Emission Rates

The basic exhaust emission rates for LDGVs were derived for the most part from data on in-use vehicles with no observed tampering. The basic assumption in the derivation of the emission rates is that emission levels change linearly as vehicles accumulate mileage. The rates are dependent upon two estimated variables: (1) zero mile emission levels and (2) the emission deterioration rates. The zero mile emission levels are the average grams of pollutants emitted by the vehicles at zero miles. The emission deterioration rates adjust the zero mile levels as vehicles accumulate mileage.

The basic exhaust emission levels are calculated from a linear function:

BERipn = ZMLip + DRip * Min

where the lower case letters are subscripts and

BERipn = The basic exhaust emission level relecting no tampering, in g/mile, for model year i and pollutant p, on January 1 of calendar year n.

ZMLip = The estimated zero mile emission level, in g/mile, for model year i and pollutant p.

DRip = The estimated emission deterioration rate, in g/mile/10,000 miles, for model year i and pollutant p.

Min = The model year i cumulative mileage, divided by 10,000 miles, on January 1 of calendar year n.

The basic exhaust emission rates reflecting zero tampering are presented in Table 1.1.1A for the different LDGV model year groups and pollutants.

## 1.B.2 Tampering Offsets and Emission Rates With Tampering

Tampering offsets in g/mi are added to the basic emission rates (which reflect no tampering) so that the overall fleet emissions reflect national average tampering. The exhaust emission rates including tampering are presented in Table 1.1.1B for the different LDGV model year groups and pollutants.

Tampering effects are first estimated for each type of tampering and operating mode (cold start, stabilized and hot start).

TAMPOFFipmn = TAMPipm * PEQUIPim * RATEimn

Where:

TAMPOFFipmn = The emission offset due to tampering in g/mi for model year i, pollutant p, and tampering type m in calendar year n.

TAMPipm = The emission offset in g/mi for model year i, pollutant p, tampering type m.

PEQUIPim = The percent of the model year i equipped with equipment type m.

RATEimn = The tampering rate of model year i, equipment m in year n (dependent on mileage).

After the offsets of each type of tampering are estimated, they are combined to form estimates of overall tampering for cold start, stabilized, and hot start modes. They are then corrected for temperature and combined in the following relationship:

OMTTAMipn = TAMPOFFipn1 * CS * TCF1 +
TAMPOFFipn2 * ST * TCF2 +
TAMPOFFipn3 * HS * TCF3

where:

OMTTAMipn = The composite tampering offset for model year i, pollutant p in calendar year n.

TAMPOFFipn1,2,3 = The tampering offsets for each operating mode (cold start, stabilized, hot start).

CS = Percent of VMT accumulated in cold start mode.

ST = Percent of VMT accumulated in stabilized mode.

HS = Percent of VMT accumulated in hot start mode.

TCF1, TCF2, CF3 = Temperature correction factors for each mode of operation.

### 1.B.3 Crankcase and Evaporative HC Emission Levels

In addition to the basic exhaust HC emission levels and tampering offsets, crankcase and evaporative HC emissions need to be included. Crankcase HC emissions result from the crankcase as the engine is running. The two major sources of evaporative HC emissions are hot soak and diurnal losses. Hot soak losses are generally produced as fuel evaporates from the carburetor system at the end of a trip. Changes in ambient temperature result in expansion of the air-fuel mixture in a partially filled fuel tank. As a result, diurnal HC emissions are expelled into the atmosphere. Crankcase and evaporative HC emission levels are calculated according to the equation in Section 1.A.2.

Crankcase and evaporative HC emission levels for untampered vehicles are summarized in Table 1.1.1C. The rates including tampering are presented in Table 1.1.1D.

### 1.B.4 January 1 Basic Exhaust Emission Levels

The basic exhaust emission levels for the latest 20 model years on January 1, 1980 through 2003, are given in Tables 1.1.2A through 1.1.2C for HC, CO, and NOx, respectively. The HC basic exhaust emission levels reflect total, rather than nonmethane HC emissions, and include crankcase and evaporative HC emission levels. Also, all emission rates include tampering.

### 1.B.5 Idle Exhaust Emission Rates (Hot Stabilized)

Estimates of emissions from the automotive fleet during a vehicle's idle operating mode have become more of a concern in transportation control plans, environmental impact statements, and state implementation plans. Examples of extended idle time are waits at shopping centers, airports, sport complexes, and drive-in window service businesses. The emission estimates presented in this section reflect engines operating in a hot stabilized condition.

The idle exhaust emission rates are expressed in units of grams per minute as opposed to the basic exhaust emission rate units of grams per mile. The LDGV idle exhaust emission levels are calculated from the estimated zero mile emission levels and emission deterioration rates given in Table 1.1.3. The idle emission level (in units of g/min) is calculated from a linear function similar to the basic exhaust emission level function given in Section 1.B.1. The idle emission function is IERipn = ZMLIDLip + DRIDLip * Min. The definition of the terms in this equation are almost identical to those in Section 1.B.1, except these are idle emissions and are expressed in grams/minute for the zero mile levels and grams/minute/10,000 miles for the idle emission deterioration rates.

## 1.C TRAVEL WEIGHTING FRACTIONS

The LDGV travel weighting fractions are the individual model year proportions of the total LDGV VMT. To generate the travel weighting fractions, three distributions are required: (1) the fleet annual mileage accumulation rate distribution, (2) the registration distribution, and (3) the estimated fleet sales fraction distribution (to account for the proportional increase of diesel powered vehicles).

The travel weighting fractions in this document reflect a January 1 evaluation date. For the LDGVs, the model year is assumed to begin sales on the October 1 preceding the corresponding calendar year. Further, it is assumed that the vehicles are sold and accumulate mileage according to a uniform distribution. These assumptions permit the estimation of the January 1 fleet mileage accumulation rate distribution and the January 1 registration distribution from July 1 information. An example of the travel weighting fraction calculation is given in Table 1.1.5.

### 1.C.1 Fleet Annual Mileage Accumulation Rate Distribution

A given vehicle is assumed to travel according to the annual mileage accumulation distribution given in Table 1.1.4. For example, the vehicle in its first year travels 12,818 miles at a uniform rate. In its second year, it travels 12,102 miles at a uniform rate. Finally in its 20th year, it travels 4,305 miles at a uniform rate.

The annual fleet mileage accumulation rate distribution is derived from the annual mileage accumulation rate distribution for individual vehicles. This derivation averages out the effects of purchase date. The derivation is described in Appendix D, and the resulting distribution is given in Table 1.1.4.

### 1.C.2 Model Year Registration Distribution

Table 1.1.4 also presents the estimated LDGV model year registration distribution fractions. These fractions are the individual model year proportions of the entire LDV fleet (both gasoline and diesel powered vehicles combined). The registration distribution is based on July 1 figures and is transformed to January 1 figures according to the procedure in Appendix D. The January 1 LDV fleet registration distribution is also presented in Table 1.1.4.

### 1.C.3 Fleet Sales Distribution

Assuming that diesel powered vehicles will become more prominent, the travel weighting fractions need to account for them. It is estimated that gasoline powered vehicles will account for proportionately fewer of the future light duty vehicle model year sales according to the distribution given in Table 1.1.5 (Column B). The distribution is anticipated to stabilize in 1991, with about 90 percent of the LDV sales being gasoline powered vehicles.

The fleet sales distribution is used in the travel weighting fractions to account for the influx of diesels. The travel weighting fractions change every January 1 in calendar years 1970 through 2010. Prior to 1975, diesels are considered to be an insignificant proportion of the LDV fleet. Further, even though the fleet sales distribution is predicted to stabilize in 1991, the travel weighting fractions require 20 years to stabilize. From that time on (2010+), the travel weighting fractions remain constant.

## 1.D EMISSION CORRECTION FACTORS

The LDGV basic exhaust emission levels are based on test results under the standardized conditions defined in Section 1.A.1. However, the basic exhaust emission levels are affected by ambient and vehicle usage conditions which differ from the prescribed test procedure. The conditions under which emissions are known to vary are the average speed, ambient temperature, fraction of VMT in cold and hot start operating modes, use of air conditioning, carrying of an extra load, trailer towing, and humidity. Emission correction factors are available to compensate for variations in these conditions.

### 1.D.1 Speed Correction Factor

The test procedure used for collecting the basic exhaust emissions is a driving cycle with an average speed of 19.6 mph. For those situations where the average speed of the vehicle deviates from this value, a speed correction factor is applied.

The coefficients for the speed correction factors are given in Table 1.1.6. The speed correction factor is symbolized as SCFipsxw where the lower case letters are subscripts and

SCFipsxw = The speed correction factor for model year i and pollutant p at the average speed of s. This is normalized to the speed associated with a cold start mode VMT fraction x and a hot start mode VMT fraction w.

The user is cautioned that this correction factor is only valid for speeds in the 5 through 55 mph range since the regression equations were based on speed data in that range. Extrapolations to speeds beyond this range should not be made.

### 1.D.2 Emission Temperature Correction Factor and Bag 1 CO Offset

The LDGV emission test procedure requires an ambient temperature of between 68°F and 86°F, and typically it runs at about 75°F. For temperatures other than 75°F, a correction factor is needed. There are two correction factor models. The first is a multiplicative model which is applicable to all pollutants and bag segments except Bag 1 CO. The second model is an additive or offset model for Bag 1 CO.

The multiplicative model uses a separate correction factor for each bag and pollutant. The equation is as follows:

TCFipbt = EXP(TCipbtt(T - TT))

where the lower case letters are subscripts and

TCFipbt = The emission temperature correction factor for model year i, pollutant p, test segment b, and ambient temperature t.

EXP = The exponential function.

TCipbtt = The temperature correction factor coefficient for model year i, pollutant p, test segment b, and reference temperature tt.

T = Ambient temperature (Fahrenheit).

TT = Reference temperature which equals 75.0°F.

The offset model for Bag 1 CO emissions uses the following equation:

Offset = (-1.3812)(T-75)

The offset model is in effect only for all 1980 and later LDGVs. The temperature correction factor coefficients are found in Table 1.1.7A.

### 1.D.3 Temperature/Operating-Mode Emission Correction Factor

For all conditions except where the CO offset model is in effect, a single emission correction factor called OMTCF adjusts for temperature and hot stabilized/cold start operating-mode conditions that differ from the basic test procedure. A vehicle will usually emit more emissions in a cold start mode than in a stabilized or a hot start mode. As such, vehicles will emit more pollution after an extended engine off period than vehicles that have not set long enough to be in the cold start mode. As a result, the operating mode is a necessary element of this correction factor.

An integral part of the operating mode portion of OMTCF are the normalized bag fractions. The normalized bag fractions adjust OMTCF for emissions attributable to each operating mode. These fractions for LDGVs are given in Table 1.1.7B.

The OMTCF correction factor is defined as follows:

OMTCFiptwxn = ((TERM1 + TERM2 + TERM3)/DENOM)

where

OMTCFiptwxn = The temperature operating-mode emission correction factor for model year i, pollutant p, ambient temperature t, fraction of VMT in a cold start operating mode w, and fraction of VMT in a hot start operating mode x; on January 1 of calendar year n.

TERM1 = W * TCFip1t *(Bip1 + Dip1 * Min)

TERM2 = (1-W-X)*TCFip2t * (Bip2 + Dip2 * Min)

TERM3 = X * TCFip3t *(Bip3 + Dip3 * Min)

DENOM = Bip0 + Dip0 * Min

Bipb = The normalized bag fraction intercept coefficient for model year i, pollutant p, and test segment b (test segment 0 is the entire basic test procedure).

Dipb = The normalized bag fraction slope coefficient for model year i, pollutant p, and test segment b (test segment 0 is the entire basic test procedure).

Min = The fleet cumulative mileage for model year i on January 1 of calendar year n.

W = The fraction of VMT traveled in the cold start mode.

X = The fraction of VMT traveled in the hot start mode.

TCFipbt = The emission temperature correction factor for model year i, pollutant p, test segment b, and ambient temperature t.

When the temperature is less than 75°F and when the percent cold start is greater than zero TCFiplt is taken out of TERM1. Then OMTCF reflects the temperature and operating mode correction factors for the stabilized and hot start operating modes, but only the operating mode correction factor for the cold start mode. The emissions of the cold start mode are corrected for temperature with the CO offset discussed in 1.D.2. This offset is multiplied by the percent of VMT accumulated in the cold start (W) and added to the basic emission rate as presented in Section 1.A.2.

### 1.D.4 Air Conditioning Correction Factor

The LDGV emissions can be affected by the use of air conditioning. The air conditioning correction factor coefficients are based on data from vehicles tested at several different temperatures with the air conditioner on. These correction factors are given in Table 1.1.8A. The general correction factor equation is as follows:

ACCFipt = U*Vi ([Aip + Bip * (T - 75)] -1) +1

where the lower case letters are subscripts and

ACCFipt = The air conditioning correction factor for model year i, pollutant p, and ambient temperature t.

U = (DI - DILO)/(DIHI - DILO) = Of the vehicles equipped with an air conditioner, the estimated fraction that have it in use (0≤ U≤1).

DI = (DB + WB) * .4 + 15 = Discomfort index.

DB = The dry bulb temperature in degrees Fahrenheit.

WB = The wet bulb temperature in degrees Fahrenheit.

DILO = The highest discomfort index where no air conditioners are in use (set to 70 in MOBILE3).

DIHI = The lowest discomfort index where all the air conditioners are in use (set to 80 in MOBILE3).

Vi = The fraction of model year i LDGVs equipped with an air conditioner. These fractions are given in Table 1.1.8B.

Aip = The air conditioning correction factor intercept coefficient for model year i and pollutant p.

Bip = The air conditioning correction factor slope coefficient for model year i and pollutant p.

T = Ambient temperature in degrees Fahrenheit.

75 = The normalizing ambient temperature for the ACCF linear function.

### 1.D.5 Extra Load Correction Factor

The basic exhaust emission rates are based on the "typical" vehicle weight with a driver and passenger, vehicle fuel, and other liquids. There are, however, situations in which vehicles have extra weight due to additional passengers, luggage, etc. In these events, emissions are known to change.

To apply the vehicle extra load correction factor found in Table 1.1.9 to a specific situation, it is necessary for a user to have an estimate of the percentage of LDGV VMT accumulated with an additional 500 pounds. The correction factor for extra load is computed according to the following equation:

ELCFip = (XLCip -1) * U + 1

where the lower case letters are subscripts and

ELCFip = The extra load correction factor for model year i and pollutant p.

XLCip = The extra load correction factor coefficient for model year i and pollutant p.

U = The fraction of LDGV VMT accumulated with an extra load ($0 \leq U \leq 1$).

### 1.D.6 Trailer Towing Correction Factor

As with the extra load correction factor, the trailer towing correction factor will adjust LDGV emissions for usage conditions which differ from the basic test procedure. It has been determined that towing a trailer will affect a vehicle's emissions. As such, a correction factor is available to adjust LDGV emissions when a trailer is being towed. The correction factor coefficients given in Table 1.1.10 are valid for a trailer weight of 1000 pounds. This correction factor is computed by the following equation:

$$TTCF_{ip} = (TTC_{ip} - 1) * U + 1$$

where the lower case letters are subscripts and

TTCFip = The trailer towing correction factor for model year i and pollutant p.

TTCip = The trailer towing correction factor coefficient for model year i and pollutant p.

U = The fraction of LDGV VMT accumulated while towing a trailer ($0 \leq U \leq 1$).

### 1.D.7 NOx Humidity Correction Factor

The NOx emission factors are normalized to 75 grains of water per pound of dry air. In order to adjust NOx emissions to different humidity conditions, a multiplicative correction factor is available. The formula for the correction factor is given below, and is applicable for all model years:

$$HCF = 1.0 - .0038 * (H - 75)$$

where:

HCF = The NOx humidity correction factor.

H = Humidity level in grains of water per pound of dry air ($20 \leq H \leq 140$).

## Chapter 2

# LIGHT DUTY GASOLINE POWERED TRUCKS I

### 2.A INTRODUCTION

This chapter presents the emission factors for light duty gasoline powered trucks with a gross vehicle weight (GVW) rating of 6,000 pounds or less (LDGT1). Although LDGT1s have a load carrying capability that exceeds that of passenger cars, they are typically used for personal transportation and light hauling.

### 2.A.1 Test Procedure

The test procedure used for determining the LDGT1 basic exhaust emissions is almost identical to the LDGV test procedure. The difference between the two test procedures is primarily the road-load horsepower setting. The summary of the test procedure in Chapter 1 is correct for LDGT1s, therefore, refer to Chapter 1.

### 2.A.2 General Emissions Calculation Equations

The equations presented in Chapter 1 are also valid for the LDGT1s. Although the emissions, travel weighting fractions, and emission correction factors levels for LDGT1s are different from the LDGVs, the equations are identical.

### 2.B EMISSIONS

This section discusses the LDGT1 emission estimates: Basic exhaust emission rates, tampering offsets, crankcase and evaporative HC emission levels, January 1 basic exhaust emission levels, and idle exhaust emission rates. The emission standards are given in Section A.1.2 of Appendix A. The emissions reflect trucks which have received typical in-use maintenance. Further, the trucks are not involved in an I/M or anti-tampering program.

The discussions of the different emissions in Chapter 1 are also valid for the LDGT1s.

### 2.B.1 Basic Exhaust Emission Rates

The LDGT1 basic exhaust emission rates are given in Table 1.2.1A. This table presents the untampered LDGT1 zero mile emission levels and emission deterioration rates for every model year. The emissions are measured in grams per mile.

### 2.B.2 Tampering Offsets and Emission Rates With Tampering

Emission offsets in g/mi due to tampering are added to the basic emission rates (which reflect no tampering) so that the fleet emission rates reflect national average tampering. The exhaust emission rates including tampering are presented in Table 1.2.1B for the different LDGT1 model year groups and pollutants.

### 2.B.3 Crankcase and Evaporative HC Emission Levels

The LDGT1 crankcase and evaporative HC emission levels are presented in Table 1.2.1C. This table presents the emissions for every model year and crankcase and evaporative HC component: diurnal losses, hot soak losses, and crankcase losses. The evaporative and crankcase rates with tampering included are shown in Table 1.2.1D.

### 2.B.4 January 1 Basic Exhaust Emission Levels

January 1, 1980 through 2003, LDGT1 exhaust emission levels with tampering are given in Tables 1.2.2A through 1.2.2C for HC, CO, and NOx, respectively. The HC basic exhaust emission levels reflect total, rather than non-methane, HC emissions and include crankcase and evaporative HC levels.

### 2.B.5 Idle Exhaust Emission Rates (Hot Stabilized)

The LDGT1 hot stabilized idle exhaust emission rates are given in Table 1.2.3. These emission levels are measured in grams per minute and reflect engines operating in a hot stabilized condition.

## 2.C TRAVEL WEIGHTING FRACTIONS

The LDGT1 travel weighting fractions are the individual model year proportions of the total LDGT1 VMT. To generate the travel weighting fractions, three distributions are required: (1) the fleet annual mileage accumulation rate distribution, (2) the registration distribution, and (3) the estimated fleet sales fraction distribution (to account for the proportional increase of diesel powered trucks). The first and second distributions are given in Table 1.2.4, and the third distribution is given in Table 1.2.5. More detailed information is available in Chapter 1 on these distributions.

The travel weighting fractions in this document reflect a January 1 evaluation date. For the LDGT1s, the model year is assumed to begin sales on the October 1 preceding the corresponding calendar year. Further, it is assumed that the trucks are sold and accumulate mileage according to a uniform distribution. These assumptions permit the estimation of the January 1 fleet mileage accumulation rate distribution and the January 1 registration distribution from July 1 information. An example of the travel weighting fraction calculation is given in Table 1.2.5.

## 2.D EMISSION CORRECTION FACTORS

The LDGT1 basic exhaust emission levels are based on test results under the standardized conditions defined in Chapter 1. However, the basic exhaust emission levels are affected by ambient and truck usage conditions which differ from the prescribed test procedure. The conditions under which emissions are known to vary are the average speed, ambient temperature, fraction of VMT in cold and hot start operating modes, use of air conditioning, carrying of an extra load, trailer towing, and humidity level. Emission correction factors are available to compensate for these conditions.

The LDGT1s correction factors are based on the LDGV information. Therefore, the LDGT1 correction factors are those from the LDGV's, and the LDGV discussions in Chapter 1 are valid for the LDGT1s.

### 2.D.1 Speed Correction Factor

The test procedure used for collecting the basic exhaust emissions is a driving cycle with an average speed of 19.6 mph. For those situations where the average speed of the truck deviates from this value, a speed correction factor is applied. The LDGT1 speed correction factors are given in Table 1.2.6.

### 2.D.2 Emission Temperature Correction Factor

For those situations where the ambient temperature is not 75°F, an emission temperature correction factor is applied. Table 1.2.7A presents these correction factors for the LDGT1s. The CO offset model for Bag 1 is in effect for 1984 and later LDGT1s.

### 2.D.3 Temperature/Operating-Mode Emission Correction Factor

A single emission correction factor called OMTCF adjusts for temperature and operating-mode conditions that differ from the basic test procedure. As described in Chapter 1, OMTCF depends on normalized bag fractions. The LDGT1 normalized bag fractions are given in Table 1.2.7B.

### 2.D.4 Air Conditioning Correction Factor

The LDGT1 emissions can be significantly affected by the use of air conditioning. These correction factors are given in Table 1.2.8A. The fractions of LDGT1s equipped with an air conditioner, by model year, are given in Table 1.2.8B.

### 2.D.5 Extra Load Correction Factor

The basic exhaust emission rates are based on the "typical" truck weight with a driver and passenger, fuel, and other liquids. There are, however, situations in which trucks have extra weight due to additional passengers, luggage, load, etc. In these events, emissions are known to change.

To apply the truck extra load correction factor found in Table 1.2.9 to a specific situation, it is necessary for a user to have an estimate of the percentage of LDGT1 VMT accumulated with an additional 500 pounds.

### 2.D.6 Trailer Towing Correction Factor

As with the extra load correction factor, the trailer towing correction factor will adjust LDGT1 emissions for usage conditions which differ from the basic test procedure. The correction factor coefficients given in Table 1.2.10 are valid for a trailer weight of 1000 pounds.

### 2.D.7 NOx Humidity Correction Factor

The NOx humidity correction factor equation is the same as for LDGV's.

# Chapter 3

# LIGHT DUTY GASOLINE POWERED TRUCKS II

## 3.A INTRODUCTION

This chapter presents the emission factors for light duty gasoline powered trucks with a gross vehicle weight (GVW) rating between 6,001 and 8,500 pounds (LDGT2). This vehicle type is required since these trucks were classified as heavy duty vehicles through the 1978 model year. Beginning with the 1979 model year, these trucks have been considered light duty trucks.

In general, every LDGV section and subsection discussion in Chapter 1 is valid for this chapter.

### 3.A.1 Test Procedure

The test procedure used for determining the LDGT2 basic exhaust emissions is almost identical to the LDGV test procedure. The difference between the two test procedures is primarily the road-load horsepower setting. The LDGV test procedure summarized in Chapter 1 is valid for the LDGT2s.

### 3.A.2 General Emissions Calculation Equations

Chapter 1 also presents the equations that are valid for the LDGT2s. Although the emissions, travel weighting fractions, and emission correction factors for the LDGT2s are different from the LDGVs, the equations are identical.

## 3.B EMISSIONS

This section presents the LDGT2 emissions: Basic exhaust emission rates, tampering offsets, crankcase and evaporative HC emission levels, January 1 basic exhaust emission levels, and idle exhaust emission rates. The pre-1979 model year LDGT2 were considered heavy duty vehicles; their emission standards are given in Section A.1.3 of Appendix A. The 1979 and later LDGT2 emission standards are given in Section A.1.2 of Appendix A. The emissions reflect trucks which have received typical in-use maintenance. Further, the trucks are not involved in an I/M or anti-tampering program.

### 3.B.1 Basic Exhaust Emission Rates

The LDGT2 basic exhaust emission rates are given in Table 1.3.1A. This table presents the LDGT2 untampered zero mile emission levels and emission deterioration rates for every model year. The emissions are measured in grams per mile.

### 3.B.2 Tampering Offsets and Emission Rates With Tampering

Emission offsets in g/mi due to tampering are added to basic emission rates (which reflect zero tampering) so that the fleet emission rates reflect national average tampering. The exhaust emission rates including tampering are presented in Table 1.3.1B for the different LDGT2 model year groups and pollutants.

### 3.B.3 Crankcase and Evaporative HC Emission Levels

The LDGT2 untampered crankcase and evaporative HC emission levels are given in Table 1.3.1C. This table presents the emissions for every model year and emission component: diurnal losses, hot soak losses, and crankcase losses. The emission rates with tampering included are shown in Table 1.3.1D.

### 3.B.4 January 1 Basic Exhaust Emission Levels

January 1, 1980 through 2003, LDGT2 exhaust emission levels with tampering are given in Tables 1.3.2A through 1.3.2C for HC, CO, and NOx, respectively. The HC basic exhaust emission levels reflect total, rather than nonmethane, HC emissions and include crankcase and evaporative HC levels.

### 3.B.5 Idle Exhaust Emission Rates (Hot Stabilized)

The LDGT2 hot stabilized idle exhaust emission rates are given in Table 1.3.3. These emissions are measured in grams per minute and reflect engines operating in a hot stabilized condition.

## 3.C TRAVEL WEIGHTING FRACTIONS

The LDGT2 travel weighting fractions are the individual model year proportions of the total LDGT2 VMT. To generate the travel weighting fractions, three distributions are required: (1) the fleet annual mileage accumulation rate distribution, (2) the registration distribution, and (3) the estimated fleet sales fraction distribution (to account for the proportional increase of diesel powered trucks). The first and second distributions are given in Table 1.3.4, and the third distribution is given in Table 1.3.5. More detailed information is available in Chapter 1 on these three distributions.

The travel weighting fractions in this document reflect a January 1 evaluation date. For the LDGT2s, the model year is assumed to begin sales on the October 1 preceding the corresponding calendar year. Further, it is assumed that the trucks are sold and accumulate mileage according to a uniform distribution. These assumptions permit the estimation of the January 1 fleet mileage accumulation rate distribution and the January 1 registration distribution from July 1 information. An example of the travel weighting fraction calculation is given in Table 1.3.5.

### 3.D EMISSION CORRECTION FACTORS

The LDGT2 basic exhaust emission levels are based on test results under the standardized conditions defined in Chapter 1. However, the basic exhaust emission levels are affected by ambient and truck usage conditions which differ from the prescribed test procedure. The conditions under which emissions are known to vary are the average speed, ambient temperature, fraction of VMT in cold and hot start operating modes, use of air conditioning, carrying of an extra load, trailer towing, and humidity level. Emission correction factors are available to compensate for these conditions.

The LDGT2 emission correction factors are based on the LDGV information. Therefore, the LDGT2 correction factors are those from the LDGVs, and the discussions in Chapter 1 are valid for the LDGT2s.

#### 3.D.1 Speed Correction Factor

The test procedure used for collecting the basic exhaust emissions is a driving cycle with an average speed of 19.6 mph. For those situations where the average speed of the truck deviates from this value, a speed correction factor is applied. The LDGT2 average cycle speed emission correction factors are given in Table 1.3.6.

#### 3.D.2 Emission Temperature Correction Factor

For those situations where the ambient temperature is not 75°F, an emission temperature correction factor is applied. Table 1.3.7A presents these correction factor for the LDGT2s. The CO offset model for Bag 1 is in effect for 1984 and later LDGT2s.

#### 3.D.3 Temperature/Operating-Mode Emission Correction Factor

A single emission correction factor called OMTCF adjusts for speed, temperature and operating-mode conditions that differ from the basic test procedure. As described in Chapter 1, OMTCF depends on normalized bag fractions. The LDGT2 normalized bag fractions are given in Table 1.3.7B.

#### 3.D.4 Air Conditioning Correction Factor

The LDGT2 emissions can be significantly affected by the use of air conditioning. These correction factors are given in Table 1.3.8A. The fractions of LDGT2s equipped with an air conditioner, by model year, are given in Table 1.3.8B.

### 3.D.5 Extra Load Correction Factor

The basic exhaust emission rates are based on the "typical" truck weight with a driver and passenger, fuel, and other liquids. There are, however, situations in which trucks have extra weight due to additional passengers, luggage, load, etc. In these events, emissions are known to change.

To apply the truck extra load correction factor found in Table 1.3.9 to a specific situation, it is necessary for a user to have an estimate of the percentage of LDGT2 VMT accumulated with an additional 500 pounds.

### 3.D.6 Trailer Towing Correction Factor

As with the extra load correction factor, the trailer towing correction factor will adjust LDGT2 emissions for usage conditions which differ from the basic test procedure. The correction factor coefficients given in Table 1.3.10 are valid for a trailer weight of 1000 pounds.

### 3.D.7 NOx Humidity Correction Factor

The NOx humidity correction factor equation is the same as for LDGV's.

# Chapter 4

# HEAVY DUTY GASOLINE POWERED VEHICLES

## 4.A INTRODUCTION

This chapter presents the emission factors for the heavy duty gasoline powered vehicles (HDGV). A HDGV is defined to be any gasoline fueled motor vehicle designated primarily for the transportation of property and rated at more than 8,500 pounds gross vehicle weight (GVW), or designated primarily for transportation of persons and having a capacity of more than 12 persons.

### 4.A.1 Test Procedure

The HDGV basic exhaust emission rates are based on the engine dynamometer transient test procedure stipulated in the Federal Register (45 FR 4181, January 21, 1980) and the Code of Federal Regulations (40 CRF, Part 86, Subpart N, July 1, 1984). The basic test conditions under which the HDGVs are tested are as follows:

1. Ambient temperature range is 68°F through 86°F.
2. Absolute humidity is adjusted to 75 grains of water per pound of dry air.
3. Estimated cycle speed is 19.45 mph with 27% idle operation.
4. Average percent VMT in a cold start operation is 14.3%.
5. Average percent VMT in a hot start operation is 86.7%.
6. No average percent VMT in the stabilized operation.
7. Estimated trip length is 6.5 miles.

The test procedure for the HDGVs can be briefly described by the following:

1. Generate the maximum torque vs. speed curve of the engine.
2. Precondition the engine with practice cycle runs.
3. With the engine off, let it sit for at least 12 hours between 68°F and 86°F. An optional procedure is the forced cool-down procedure, whereby cool water is circulated (and/or air directed onto the engine) through the engine's water coolant system until the engine oil is between 68°F and 75°F.
4. Conduct the cold start test. The estimated mileage is 6.5 miles and cycle speed is 19.9 mph.

5. Turn off the engine.
6. Keep the engine off for 20 minutes.
7. Conduct the hot start test. The cycle is the same as the cold start cycle.
8. Calculate the grams of pollutant and total brake horsepower-hour for each test cycle.
9. Correct NOx to 75 grains of water per pound of dry air.
10. Calculate the basic exhaust emissions in grams per brake horsepower-hour.

### 4.A.2 General Emissions Calculation Equations

To calculate the HDGV emissions, the following generalized equations are used:

a. COMPEFpnst = SUMi[TFin * ((BERipn * TCFipt-OFFMTHi + OMTTAMipn) * SCFps + CCEVERTin)]

b. IEF = SUMi [TFi *(IERipn - IDLMTHi)]

where:

COMPEFpnst = The composite emission factor in g/mi of pollutant p in calendar year n at speed s and temperature t.

SCFps = The speed correction factor for HDGV's for pollutant p and speed s.

TCFipt = The temperature correction factor for model year i (not operating mode-dependent like light duty vehicles and trucks), pollutant p and temperature t.

All other variables have the same definitions as for LDGV's. OFFMTH, CCEVERT, and IDLMTH apply only to HC emissions.

## 4.B EMISSIONS

This section discusses the emission estimates for the HDGVs. The five subsections are (1) basic exhaust emission rates, (2) emission rates including tampering, (3) crankcase and evaporative HC emission levels, (4) January 1 basic exhaust emission levels, and (5) idle exhaust emission rates. The emission standards are given in Section A.1.3 of Appendix A. The emissions reflect vehicles which have received typical in-use maintenance. Further, the vehicles are not involved in an I/M or anti-tampering program.

### 4.B.1 Basic Exhaust Emission Rates

The HDGV basic untampered exhaust emission rates are given in Table 1.4.1A. This table presents the untampered HDGV zero mile emission levels and emission deterioration rates for every model year.

The conversion factors which are used to convert the emissions in g/bhp-hr to emissions in g/mi were substantially updated from previous versions of mobile source emission factors. These conversion factors are dependent on projected sales in the different weight classes of the heavy duty gasoline vehicles and their respective fuel economies. A complete discussion of the development of these conversion factors is found in the EPA report "Heavy Duty Vehicle Emission Conversion Factors, 1962-1997", EPA-AA-SDSB-84-1.

### 4.B.2 Tampering Offsets and Emission Rates With Tampering

Tampering offsets in gm/mi are added to basic emission rates (which reflect zero tampering) so that the fleet emission rates reflect national average tampering. The exhaust emission rates including tampering are presented in Table 1.4.1B for the different HDGV model year groups and pollutants.

### 4.B.3 Crankcase and Evaporative HC Emission Levels

The HDGV untampered crankcase and evaporative HC emission levels are given in Table 1.4.1C. This table presents the emissions for every model year and emission component: diurnal losses, hot soak losses, and crankcase losses. The evaporative and crankcase emissions including tampering are shown in Table 1.4.1D.

### 4.B.4 January 1 Basic Exhaust Emission Levels

The January 1, 1980 through 2003, HDGV basic exhaust emission levels are given in Tables 1.4.2A through 1.4.2C for HC, CO, and NOx, respectively. The HC basic exhaust emission levels reflect total, rather than nonmethane, HC emissions and include crankcase and evaporative HC emission levels.

### 4.B.5 Idle Exhaust Emission Rates (Hot Stabilized)

The HDGV hot stabilized idle exhaust emission rates are given in Table 1.4.3. These emissions are measured in grams per minute and reflect engines operating in a hot stabilized condition.

## 4.C TRAVEL WEIGHTING FRACTIONS

The HDGV travel weighting fractions are the individual model year proportions of the total HDGV VMT. To generate the HDGV travel weighting fractions, two distributions are required: (1) the fleet annual mileage accumulation rate distribution and (2) the registration distribution. These two distributions are given in Table 1.4.4. More detailed information is available in Chapter 1 on these distributions.

The travel weighting fractions in this document reflect a January 1 evaluation date. For the HDGVs, the model years are assumed to begin sales on January 1. Further, it is assumed that the vehicles are sold and accumulate mileage according to a uniform distribution. These assumptions permit the estimation of the January 1 fleet mileage accumulation rate distribution and the January 1 registration distribution from July 1 information. The travel weighting fractions are given in Table 1.4.5.

## 4.D EMISSION CORRECTION FACTORS

The HDGV basic exhaust emission levels are based on test results under the standardized conditions defined in Section 4.A.1. However, the basic exhaust emission levels are affected by ambient and vehicle usage conditions which differ from the prescribed test procedure. The conditions under which HDGV emissions are known to vary are the average speed and ambient temperature. Emission correction factors are available to compensate for these conditions.

### 4.D.1 Speed Correction Factor

The test procedure used for collecting the basic exhaust emissions is a transient engine cycle with an estimated speed of 20.0 mph. For those situations where the average speed of the vehicle deviates from this value, a speed correction factor is applied. The HDGV speed correction factor equations are as follows:

a. $SCFips = EXP(Aip + Bip*s + Cip*s^2)$ for HC and CO, and

b. $SCFips = Aip + Bip*s + Cip*s^2$ for NOx

where

SCFips = The correction factor for model year i and pollutant p at the average speed of s.

EXP = The exponential function.

Aip = The speed correction factor intercept coefficient for model year i and pollutant p.

Bip = The speed correction factor first order coefficient for model year i and pollutant p.

Cip = The speed correction factor second order coefficient for model year i and pollutant p.

The coefficients for the speed correction factor equations are given in Table 1.4.6. The speed correction factors are only valid for speeds in the 5 through 55 mph range.

### 4.D.2 Emission Temperature Correction Factor

For situations where the ambient temperature is not 75°F, an emission temperature correction factor is applied. This temperature correction factor differs slightly in form from the temperature correction factor given in Chapter 1. The HDGV temperature correction factor is for the entire transient test as opposed to the LDGV temperature correction factors for the individual test segments. The HDGV temperature correction factor is given in Table 1.4.7 and the equation is as follows:

TCFipt = EXP(TCiptt(T - TT))

where the lower case letters are subscripts and

TCFipt = The emission temperature correction factor for model year i, pollutant p, and ambient temperature t.

EXP = The exponential function.

TCiptt = The temperature correction factor coefficient for model year i, pollutant p, and reference temperature tt.

T = Ambient temperature (Fahrenheit).

TT = Reference temperature which equals 75°F.

## Chapter 5

## LIGHT DUTY DIESEL POWERED VEHICLES

### 5.A INTRODUCTION

Diesel powered passenger cars may become more prominent in the light duty vehicle fleet. As a result, emission factors are required for these light duty diesel powered vehicles (LDDV). A LDDV is defined to be any diesel fueled automobile designated primarily for transportation of persons and having a capacity of 12 persons or fewer.

### 5.A.1 Test Procedure

The test procedure used for determining the LDDV basic exhaust emissions is identical to the LDGV test procedure. Therefore, refer to Chapter 1 for a brief overview.

### 5.A.2 General Emissions Calculation Equations

a. COMPEF = SUMi[(BERipn*OMTCF - OFFMTH) * TFin * SCF]

b. IEFnp = SUMi[TFin*(IERipn - IDLMTHi)]

c. OMTCF in the above equation does not include the temperature correction factors, and therefore is limited only to the operating mode correction factors.

### 5.B EMISSIONS

This section discusses the LDDV emission estimates: Basic exhaust emission rates, crankcase and evaporative HC emission levels, January 1 basic exhaust emission levels, and idle exhaust emission rates. The emission standards are given in Section A.1.1 of Appendix A. The emissions reflect vehicles which have received typical in-use maintenance. Further, the vehicles are not involved in an I/M program.

With the exception of the crankcase and evaporative HC emissions, the discussions of the different emissions in Chapter 1 are also valid for the LDDVs.

### 5.B.1 Basic Exhaust Emission Rates

The LDDV basic exhaust emission rates are given in Table 1.5.1. This table presents the LDDV zero mile emission levels and emission deterioration rates for every model year. The emissions are measured in grams per mile.

EPA believes that diesel vehicles are subjected to very little tampering, therefore, tampering offsets are not added to any diesel vehicles.

### 5.B.2 Crankcase and Evaporative HC Emission Levels

LDDVs are considered to have insignificant crankcase and evaporative HC emission levels. Therefore, no emission estimates are given.

### 5.B.3 January 1 Basic Exhaust Emission Levels

January 1, 1980 through 2003, LDDV basic exhaust emission levels are given in Tables 1.5.2A through 1.5.2C for HC, CO, and NOx, respectively. The HC basic exhaust emission levels reflect total, rather than nonmethane, HC emissions.

### 5.B.4 Idle Exhaust Emission Rates (Hot Stabilized)

The LDDV hot stabilized idle exhaust emission rates are given in Table 1.5.3. These emission levels are measured in grams per minute and reflect engines operating in a hot stabilized condition.

## 5.C TRAVEL WEIGHTING FRACTIONS

The LDDV travel weighting fractions are individual model year proportions of the total LDDV VMT. To generate the travel weighting fractions, three distributions are required: (1) the fleet annual mileage accumulation rate distribution, (2) the registration distribution, and (3) the estimated fleet sales fraction distribution (to account for the proportional increase of diesel powered vehicles). The first and second distributions are given in Table 1.5.4, and the third distribution is given in Table 1.5.5. More detailed information is available in Chapter 1 on these distributions.

The travel weighting fraction in this document reflect a January 1 evaluation date. For the LDDVs, the model year is assumed to begin sales on the October 1 preceding the corresponding calendar year. Further, it is assumed that the vehicles are sold and accumulate mileage according to a uniform distribution. These assumptions permit the estimation of the January 1 fleet mileage accumulation rate distribution and the January 1 registration distribution from July 1 information. An example of the travel weighting fraction calculation is given in Table 1.5.5.

## 5.D EMISSION CORRECTION FACTORS

The LDDV basic exhaust emission levels are based on test results under the standardized conditions defined in Chapter 1. However, the basic exhaust emission levels are affected by ambient and vehicle usage conditions which differ from the prescribed test procedure. The conditions under which LDDV emissions are known to vary are the average speed, and fraction of VMT in cold and hot start operating modes. Emission correction factors are available to compensate for these conditions. Use of air conditioning, carrying of an extra load, trailer towing, and humidity levels may affect LDDV emissions, but no information is available to estimate the effects.

### 5.D.1 Speed Correction Factor

The test procedure used for collecting the basic exhaust emissions is a driving cycle with an average speed of 19.6 mph. For those situations where the average speed of the vehicle deviates from this value, a speed correction factor is applied.

The LDDV speed correction factor equation and coefficients are given in Table 1.5.6. The speed correction factor for LDDVs is normalized to 19.6 mph. The LDDV speed correction factor equation is as follows:

$$SCF = EXP[Ap(SPD-SADJ) + Bip(SPD^2-SADJ^2)]$$

where:

Aip = The speed first order term speed correction factor coefficient for pollutant p.

SPD = The speed for which the correction factor is being estimated.

SADJ = Speed, adjusted for cold start w and hot start x VMT fractions. $1/SADJ = ((W + X/26) + ((1-W-X)/16)$.

Bp = The second order term correction factor coefficent for pollutant p.

The user is cautioned that the correction factor as given in Table 1.5.6 is only valid for speeds in the 5 through 55 mph range since the regression equations were based on speed data in that range. Extrapolations to speeds beyond this range should not be made.

### 5.D.2 Emission Temperature Correction Factor

The emissions of LDDV's may be somewhat dependent on temperature, but that dependence is thought to be much less for diesel vehicles than for gasoline vehicles. Also, EPA has no data on emissions from diesel vehicles at different temperatures. Therefore, the temperature coefficients for LDDV's are all zeros, and result in a conversion factor of unity at all temperatures.

### 5.D.3 Speed/ Operating-Mode Emission Correction Factor

A single emission correction factor called OMTCF adjusts for speed and operating-mode conditions that differ from the basic test procedure. As described in Chapter 1, OMTCF depends on normalized bag fractions. The LDDV normalized bag fractions are given in Table 1.5.7.

## Chapter 6

## LIGHT DUTY DIESEL POWERED TRUCKS

### 6.A INTRODUCTION

The light duty diesel powered trucks (LDDT) are becoming more prominent in the light duty truck fleet. Therefore, the LDDT emission factors are required. A LDDT is defined to be any diesel fueled motor vehicle designed primarily for transportation of property and rated at 8,500 pounds gross vehicle weight or less.

### 6.A.1 Test Procedure

The test procedure used for determining the LDDT basic exhaust emissions is almost identical to the LDGV test procedure. The difference between the two test procedures is primarily the road-load horsepower setting. The summary of the test procedure in Chapter 1 is correct for LDDTs. Therefore, refer to Chapter 1 for a brief overview.

### 6.A.2 General Emissions Calculation Equations

The generalized calculating equations for the LDDTS are presented in Chapter 5. All of the equations are identical, although the emissions, travel weighting fractions, and emission correction factors levels for LDDTs are different from the LDDVs.

### 6.B EMISSIONS

This section discusses the LDDT emission estimates: Basic exhaust emission rates, crankcase and evaporative HC emission levels, January 1 basic exhaust emission levels, and idle exhaust emission rates. The emission standards are given in Section A.1.2 of Appendix A. Prior to the 1978 model year, the number of LDDTs are considered insignificant. As a result, no emissions are measured prior to January 1, 1978. The emissions also reflect trucks which have received typical in-use maintenance. Further, the trucks are not involved in an I/M program.

With the exception of the crankcase and evaporative HC emissions, the discussions of the different emissions in Chapter 1 are valid for the LDDTs.

### 6.B.1 Basic Exhaust Emission Rates

The LDDT basic exhaust emission rates are given in Table 1.6.1. This table presents the LDDT zero mile emission levels and emission deterioration rates for every model year. The emissions are measured in grams per mile.

EPA believes that diesel vehicles are subjected to very little tampering, therefore, tampering offsets are not added to all diesel vehicles.

### 6.B.2 Crankcase and Evaporative HC Emission Levels

LDDT are considered to have insignificant crankcase and evaporative HC emission levels. Therefore, no emission estimates are given.

### 6.B.3 January 1 Basic Exhaust Emission Levels

January 1, 1980 through 2003, LDDT basic exhaust emission levels are given in Tables 1.6.2A through 1.6.2C for HC, CO, and NOx, respectively. The HC basic exhaust emission levels reflect total, rather than nonmethane, HC emissions.

### 6.B.4 Idle Exhaust Emission Rates (Hot Stabilized)

The LDDT hot stabilized idle exhaust emission rates are given in Table 1.6.3. These emission levels are measured in grams per minute and reflect engines operating in a hot stabilized condition.

## 6.C TRAVEL WEIGHTING FRACTIONS

The LDDT travel weighting fractions are the individual model year proportion of the total LDDT VMT. To generate the travel weighting fractions, three distributions are required: (1) the fleet annual mileage accumulation rate distribution, (2) the registration distribution, and (3) the estimated fleet sales fraction distribution (to account for the proportional increase of diesel powered trucks). The first and second distributions are given in Table 1.6.4, and the third distribution is given in Table 1.6.5. More detailed information is available in Chapter 1 on these distributions.

The travel weighting fractions in this document reflect a January 1 evaluation date. For the LDDTs, the model year is assumed to begin sales on the October 1 preceding the corresponding calendar year. Further, it is assumed that the trucks are sold and accumulate mileage according to a uniform distribution. These assumptions permit the estimation of the January 1 fleet mileage accumulation rate distribution and the January 1 registration distribution from July 1 information. An example of the travel weighting fraction calculation is given in Table 1.6.5.

## 6.D EMISSION CORRECTION FACTORS

The LDDT basic exhaust emission levels are based on test results under the standardized conditions defined in Chapter 1. However, the basic exhaust emission levels are affected by ambient and truck usage conditions which differ from the prescribed test procedure. The conditions under which LDDT emissions are known to vary are the average speed, and fraction of VMT in cold and hot start operating modes. Emission correction factors are available to compensate for these conditions. Use of air conditioning, carrying of an extra load, trailer towing, and humidity levels may affect LDDT emissions, but no information is available to estimate the effects.

### 6.D.1 Speed Correction Factor

The test procedure used for collecting the basic exhaust emissions is a driving cycle with an average speed of 19.6 mph. For those situations where the average speed of the truck deviates from this value, a speed correction factor is applied.

The LDDT emission cycle speed correction factor equation and coefficients are given in Table 1.6.6. The LDDT speed correction factor is normalized to 19.6 and is identical to the LDDV speed correction factor.

The user is cautioned that this correction factor is only valid for speeds in the 5 through 55 mph range since the regression equations were based on speed data in that range. Extrapolations to speeds beyond this range should not be made.

### 6.D.2 Emission Temperature Correction Factor

The emissions of LDDV's may be somewhat dependent on temperature, but that dependence is thought to be much less for diesel vehicles than for gasoline vehicles. Also, EPA has no data on emissions from diesel vehicles at different temperatures. Therefore, the temperature coefficients for LDDV's are all zeros, and result in a conversion factor of unity at all temperatures.

### 6.D.3 Temperature/Operating-Mode Emission Correction Factor

A single emission correction factor called OMTCF adjusts for speed, and operating-mode conditions that differ from the basic test procedure. As described in Chapter 1, OMTCF depends on normalized bag fractions. The LDDT normalized bag fractions are given in Table 1.6.7.

## Chapter 7

# HEAVY DUTY DIESEL POWERED VEHICLES

### 7.A INTRODUCTION

This chapter presents the emission factors for the heavy duty diesel powered vehicles (HDDV). A HDDV is defined to be any diesel fueled motor vehicle designated primarily for the transportation of property and rated at more than 8,500 pounds of gross vehicle weight (GVW). Supplementary emission factors for diesel transit buses are found in Appendix N.

### 7.A.1 Test Procedure

The test procedure used for determining the HDDV basic exhaust emissions is almost identical to the HDGV test procedure. The major difference between the two test procedures is the test cycle. The HDDV test procedure is similar to the one for HDGVs. Therefore, refer to Chapter 4 for a brief overview. The specific differences are as follows:

1. The HDDV test procedure estimated cycle speed is 19.45 mph with 36% idle operation.
2. The HDDV test procedure has the estimated trip length of 6.4 miles.
3. NOx is not corrected for humidity.

### 7.A.2 General Emissions Calculation Equations

To calculate the HDDV emissions, the following generalized equations are used:

a. COMPEF = SUMi[TFin * (BERipn - OFFMTHi) * SCFps]

b. IEFnp = SUMi[(IERipn - OFFMTH) * TFin]

where the lower case letters are subscripts, and:

COMPEF = The basic fleet exhaust emission factors in grams per mile on January 1 of calendar year n for pollutant p and average speed s.

SUMi[ ] = The summation over 20 model years from i=n-19 to i=n, where n is the calendar year.

BERipn = The basic exhaust emission level in grams/mile for model year i and pollutant p on January 1 of calendar year n.

OFFMTHi = The methane offset of total HC for model year i. This variable is only applied to HC emissions and is defined in Section E of the INTRODUCTION.

TFin = The model year i fraction of the total HDDV miles driven on January 1 of calendar year n.

SCFps = The speed correction factor for pollutant p at the average speed of s.

IEFnp = The idle exhaust emission factors in grams/minute on January 1 of calendar year n for pollutant p.

IERipn = The idle exhaust emission level in grams/minute for model year i and pollutant p on January 1 of calendar year n.

## 7.B EMISSIONS

This section discusses the emission estimates for the HDDVs. The four subsections are (1) basic exhaust emission rates, (2) crankcase and evaporative HC emission levels, (3) January 1 basic exhaust emission levels, and (4) idle exhaust emission rates. The emission standards are given in Section A.1.4 of Appendix A. The emissions reflect vehicles which have received typical in-use maintenance. Further, the vehicles are not involved in an I/M program.

The conversion factors which are used to convert the emissions in g/bhp-hr to emissions in g/mi were substantially updated from previous versions of mobile source emission factors. These conversion factors are dependent on projected sales in the different weight classes of the heavy duty gasoline vehicles and their respective fuel economies. A complete discussion of the development of these conversion factors is found in the EPA report "Heavy Duty Vehicle Emission Conversion Factors, 1962-1997", EPA-AA-SDSB-84-1 [3].

### 7.B.1 Basic Exhaust Emission Rates

The HDDV basic emission rates are given in Table 1.7.1. This table presents the HDDV zero mile emission levels and emission deterioration rates for every model year. From the HDDV test procedure, emissions are measured in grams per brake horsepower-hour. However, the emissions in this section are given in grams per mile for consistency.

### 7.B.2 Crankcase and Evaporative HC Emission Levels

HDDVs are considered to have insignificant crankcase and evaporative HC emission levels. Therefore, no emission estimates are given.

### 7.B.3 January 1 Basic Exhaust Emission Levels

The January 1, 1980 through 2003, HDDV basic exhaust emission levels are given in Tables 1.7.2A through 1.7.2C for HC, CO, and NOx, respectively. The basic exhaust emission levels reflect total, rather than nonmethane, HC emissions.

### 7.B.4 Idle Exhaust Emission Rates (Hot Stabilized)

The HDDV hot stabilized idle exhaust emission rates are given in Table 1.7.3. These emissions are measured in grams per minute and reflect engines operating in a hot stabilized condition.

## 7.C TRAVEL WEIGHTING FRACTIONS

The HDDV travel weighting fractions are the individual model year proportions of the total HDDV VMT. To generate the HDDV travel weighting fractions, two distributions are required: (1) the fleet annual mileage accumulation rate distribution and (2) the registration distribution. The registration distribution and the VMT distribution for 1978 are given in Table 1.7.4. More detailed information is available in Chapter 1 and Appendix F on these distributions.

The travel weighting fractions in this document reflect a January 1 evaluation date. For the HDDVs, the model years are assumed to begin sales on January 1. Further, it is assumed that the vehicles are sold and accumulate mileage according to a uniform distribution. These assumptions permit the estimation of the January 1 fleet mileage accumulation rate distribution and the January 1 registration distribution from July 1 information. The travel weighting fractions are given in Table 1.7.5.

## 7.D. EMISSION CORRECTION FACTORS

The HDDV basic exhaust emission levels are based on test results under the standardized conditions defined in Section 4.A.1 of Chapter 4 and Section 7.A.1. However, the basic exhaust emission levels are affected by ambient and vehicle usage conditions which differ from the prescribed test procedure. The conditions under which HDDV emissions are known to vary are the average speed and ambient temperature. Emission correction factors are available to compensate for these conditions.

### 7.D.1 Speed Correction Factor

The test procedure used for collecting the basic exhaust emissions is a transient engine cycle with an estimated speed of about 20.0 mph. For those situations where the average speed of the vehicle deviates from this value, a speed correction factor is applied. The HDDV speed correction factor equation is as follows:

$$SCFips = EXP(Aip + Bip*s + Cip*s^2)$$

where

SCFips = The correction factor for model year i and pollutant p at the average speed of s.

EXP = The exponential function

Aip = The speed correction factor intercept coefficient for model year i and pollutant p.

Bip = The speed correction factor first order coefficient for model year i and pollutant p.

Cip = The speed correction factor second order coefficient for model year i and pollutant p.

The coefficients for the speed correction factor equations are given in Table 1.7.6. The speed correction factors are only valid for speeds in the 5 through 55 mph range. Further, the speed correction factors are normalized to 20.0 mph.

### 7.D.2 Emission Temperature Correction Factor

The emissions of HDDVs may be somewhat dependent on temperature, but that dependence is thought to be much less for diesel vehicles than for gasoline vehicles. Also, EPA has no data on emissions from diesel vehicles at different temperatures. Therefore, the temperature coefficients for HDDVs are all zeros, and result in a conversion factor of unity at all temperatures.

# Chapter 8

# MOTORCYCLES

## 8.A INTRODUCTION

A motorcycle is defined as any motor vehicle designed to travel with not more than three wheels in contact with the ground, and weighing less than 1,500 pounds.

The MC fleet is composed of six engine size-type combinations: small, medium, and large engine sizes, each size having two-stroke and four-stroke engine types. Small or Class I motorcycles have engine displacements in the 50 cubic centimeter (cc) through 169 cc range. Medium or Class II motorcycles have engine displacements in the 170 cc through 279 cc range. Large or Class III motorcycles have engine displacements in the 280 cc and over range.

### 8.A.1 Test Procedure

With the exception of the Class I motorcycles, the MC basic exhaust emission test procedure is similar to the LDGV test procedure. Therefore, with the one class exception, the summary of the test procedure in Chapter 1 is correct for the MCs. Given below is a list of Class I motorcycle test procedure summary statistics that differ from the LDGV test procedure.

1. Average speed is 17.8 mph.
2. Average percent VMT in cold start operation is 18.3%.
3. Average percent VMT in hot start operation is 24.2%.
4. Average percent VMT in the stabilized operation is 57.5%
5. Average trip length is 6.8 miles.
6. Test segment #1 (cold start) and #3 (cold start) each have an average trip length of 2.89 miles and speed of 20.6 mph.
7. Test segment #2 (stabilized) has the average trip length of 3.91 miles and speed of 16.2 mph.

### 8.A.2 General Emission Calculation Equations

The MC generalized equations are almost identical to the LDGV equations. The differences are three optional emission correction factors that are not applicable for MCs: air conditioning, extra load, and trailer towing. Also, the effects of tampering are not included for motorcycles. With these four exceptions, the MC emission factors calculating equations are identical to the LDGV equations given in Chapter 1.

## 8.B EMISSIONS

This section discusses the MC emission estimates: Basic exhaust emission rates, crankcase and evaporative HC emission levels, January 1 basic exhaust emission levels, and idle exhaust emission rates. The emission standards are given in Section A.1.5 of Appendix A. The emissions reflect motorcycles which have received typical in-use maintenance. Further, the motorcycles are not involved in an I/M program.

With the exception of the six engine size-type combinations being sales weighted, the discussions of the different emissions in Chapter 1 are also valid for the MCs. Therefore, the discussions will not be reiterated. Refer to Chapter 1 for the discussions that correspond to the subsections below. Further, it is assumed that the MC emissions reflect exactly the standarized test conditions described in Chapter 1.

### 8.B.1 Basic Exhaust Emission Rates

The MC basic exhaust emission rates are given in Table 1.8.1A. This table presents the MC zero mile emission levels and emission deterioration rates for every model year. The emissions are measured in grams per mile.

### 8.B.2 Crankcase and Evaporative HC Emission Levels

The MC crankcase and evaporative HC emission levels are given in Table 1.8.1B. This table presents the emissions for every model year and emission component: diurnal losses, hot soak losses, and crankcase losses.

### 8.B.3 January 1 Basic Exhaust Emission Levels

January 1, 1980 through 2003, MC basic exhaust emisson levels are given in Table 1.8.2A through 1.8.2C for HC, CO, and NOx, respectively. The HC basic exhaust emission levels reflect total rather than nonmethane HC emissions and include crankcase and evaporative HC levels.

### 8.B.4 Idle Exhaust Emission Rates (Hot Stabilized)

The MC hot stabilized idle exhaust emission rates are given in Table 1.8.3. These emissions are measured in grams per minute and reflect engines operating in a hot stabilized condition.

## 8.C TRAVEL WEIGHTING FRACTIONS

The MC travel weighting fractions are the individual model year proportions of the total MC VMT. To generate the MC travel weighting fractions, two distributions are required: (1) the fleet annual mileage accumulation rate distribution and (2) the registration distribution.

These two distributions are given in Table 1.8.4. More detailed information is available in Chapter 1 on these distributions.

The travel weighting fractions in this document reflect a January 1 evaluation date. For the MCs, the model year is assumed to begin sales on January 1. Further, it is assumed that the motorcycles are sold and accumulate mileage according to a uniform distribution. These assumptions permit the estimation of the January 1 fleet mileage accumulation rate distribution and the January 1 registration distribution from July 1 information. The travel weighting fractions are given in Table 1.8.5.

## 8.D EMISSION CORRECTION FACTORS

The MC basic exhaust emission levels are typically based on test results under the standardized conditions defined in Chapter 1. However, the basic exhaust emission levels are affected by ambient and usage conditions which differ from the prescribed test procedure. The conditions under which emissions are known to vary are the average speed, ambient temperature, fraction of VMT in cold and hot start operating conditions, and humidity level. Emission correction factors are available to compensate for these varying conditions.

The MC emission correction factors are based on the LDGV information and the discussions in Chapter 1 are valid for MCs.

### 8.D.1 Speed Correction Factor

The test procedure used for collecting the basic exhaust emissions is typically a driving cycle with an average speed of 17.8 mph. For those situations where the average speed of the MC deviates from this value, a speed correction factor is applied. The MC speed emission correction factor is given in Table 1.8.6.

### 8.D.2 Emission Temperature Correction Factor

The established motorcycle emissions test procedure requires an ambient test temperature between 68°F and 86°F. For those situations where the ambient temperature is not 75°F, an emission temperature correction factor is applied. Table 1.8.7A presents this correction factor for the MCs.

### 8.D.3 Temperature/Operating-Mode Emission Correction Factor

A single emission correction factor called OMTCF adjusts for temperature, and operating-mode conditions that differ from the basic test procedure. As described in Chapter 1, OMTCF depends on normalized bag fractions. The MC normalized bag fractions are given in Table 1.8.7B.

### 8.D.4 NOx Humidity Correction Factor

The NOx humidity in correction factor equation is the same as for LDGVs.

## References for Part 1

1. "Compilation of Air Pollutant Emission Factors: Highway Mobile Sources", EPA 460/3-81-005, Office of Mobile Sources, U.S. Environmental Protection Agency, Ann Arbor, MI 48105, March 1981.

2. "Evapaporative HC Emissions for MOBILE3", TEB-EF-85-01, Office of Mobile Sources, U.S. Environmental Protection Agency, Ann Arbor, MI 48105, August 1985.

3. "Heavy-Duty Vehicle Emission Conversion Factors 1962-1997", SDSB-84-01, Office of Mobile Sources, U Environmental Protection Agency, Ann Arbor, MI 48105, August 1984.

4. "Fleet Characterization Data Used for MOBILE3", TEB-EF-84-02, Office of Mobile Sources, U.S. Environmental Protection Agency, Ann Arbor, MI 48105, August 1984

5. Users Guide to MOBILE3, EPA 460/3-84-002, Office of Mobile Sources, U.S. Environmental Protection Agency, Ann Arbor, MI 48105, June 1984.

6. "Anti-Tampering and Anti-Misfueling Programs to Reduce In-Use Emissions from Motor Vehicles", TSS-83-10, Office of Mobile Sources, U.S. Environmental Protection Agency, Ann Arbor, MI 48105, December 1983.

6. "Proposal for 1980 and Earlier Light-Duty Gas Vehicle Emission Factors for MOBILE3", Office of Mobile Sources, Test and Evaluation Branch, U.S. Environmental Protection Agency, Ann Arbor, MI 48105, December 1983.

# Appendix A

## NEW VEHICLE EMISSION STANDARDS

This appendix presents the emission standards assumed in this document. At the time of the MOBILE3 release, these standards represent current and projected standards. However, it is possible that some of the assumed standards are now different due to changes in regulations, waivers, etc.

### A.1 LOW AND HIGH ALTITUDE NON-CALIFORNIA HIGHWAY VEHICLE EMISSION STANDARDS

This section presents the emission standards for the eight low and high altitude non-California vehicle types. The standards are presented in five subsections. The light duty vehicle and light duty truck fleets are comprised of both diesel and gasoline powered vehicle types. The pre-1979 model year LDGT2s are heavy duty vehicles while the 1979 and later model years are light duty trucks. Finally, the high altitude standards are included in this section since there are few emission standards specific to the high altitude vehicle types.

All hydrocarbon emission standards in this section are presented for total hydrocarbon emissions.

### A.1.1 Light Duty Vehicles

The following standards, up through 1974, apply only to gasoline powered light duty vehicles. Standards for 1975 and later apply to both gasoline and diesel powered light duty vehicles[1].

| Year | Test Procedure[2] | Hydrocarbons | Carbon Monoxide | Oxides of Nitrogen | Particulates[3] | Evaporative Hydrocarbons[4] |
|---|---|---|---|---|---|---|
| Prior to controls | 7-mode | 850 ppm | 3.4% | 1000 ppm | - | - |
| | 7-mode | 11 gpm | 80 gpm | 4 gpm | - | - |
| | CVS-75 | 8.8 gpm | 87.0 gpm | 3.6 gpm | - | - |
| 1968-69 | 7-mode | | | | | |
| | 50-100 CID | 410 ppm | 2.3% | - | - | - |
| | 101-140 CID | 350 ppm | 2.0% | - | - | - |
| | over 140 CID | 275 ppm | 1.5% | - | - | - |
| 1970 | 7-mode | 2.2 gpm | 23 gpm | - | - | - |
| 1971 | 7-mode | 2.2 gpm | 23 gpm | - | - | 6.0 g/test[5] |
| 1972 | CVS-72 | 3.4 gpm | 39 gpm | - | - | 2.0 g/test |
| 1973-74 | CVS-72 | 3.4 gpm | 39 gpm | 3.0 gpm | - | 2.0 g/test |
| 1975-76 | CVS-75 | 1.5 gpm | 15 gpm | 3.1 gpm | - | 2.0 g/test |
| 1977[6] | CVS-75 | 1.5 gpm | 15 gpm | 2.0 gpm | - | 2.0 g/test |
| 1978-79 | CVS-75 | 1.5 gpm | 15 gpm | 2.0 gpm | - | 6.0 g/test |
| 1980 | CVS-75 | 0.41 gpm | 7.0 gpm | 2.0 gpm | - | 6.0 g/test |
| 1981 | CVS-75 | 0.41 gpm | 3.4 gpm[7] | 1.0 gpm[8,9] | - | 2.0 g/test |
| 1982[10] | CVS-75 | 0.41 gpm<br>(0.57) | 3.4 gpm[7]<br>(7.8) | 1.0 gpm[8,9]<br>(1.0)[8] | 0.6 gpm<br>(-) | 2.0 g/test<br>(2.6) |
| 1983[10] | CVS-75 | 0.41 gpm<br>(0.57) | 3.4 gpm<br>(7.8) | 1.0 gpm[8]<br>(1.0)[8] | 0.6 gpm<br>(-) | 2.0 g/test<br>(2.6) |
| 1984-86[11] | CVS-75 | 0.41 gpm<br>(.41) | 3.4 gpm<br>(3.4) | 1.0 gpm<br>(1.0) | 0.6 gpm<br>(-) | 2.0 g/test<br>(2.0) |
| 1987 & later[11] | CVS-75 | 0.41 gpm<br>(.41) | 3.4 gpm<br>(3.4) | 1.0 gpm<br>(1.0) | 0.2 gpm<br>(-) | 2.0 g/test<br>(2.0) |

## LIGHT DUTY VEHICLES

1 Standards do not apply to vehicles with engines less than 50 CID from 1968 through 1974.

2 Different test procedures have been used since the early years of emission control which vary in stringency. The appearance that the standards were relaxed from 1971 to 1972 is incorrect. The 1972 standards are actually more stringent because of the 1972 test procedure.

3 Applies only to diesels.

4 Evaporative emissions determined by carbon trap method through 1977, SHED procedure beginning in 1978. Applies only to gasoline-fueled vehicles.

5 Evaporative standard does not apply to off-road utility vehicles for 1971.

6 Cars sold in specified high altitude counties are required to meet standards at high altitude.

7 Carbon monoxide standard can be waived to 7.0 gpm for 1981-82 by the EPA Administrator.

8 Oxides of nitrogen standard can be waived to 1.5 gpm for innovative technology or diesel.

9 Oxides of nitrogen standard can be waived to 2.0 gpm for American Motors Corporation.

10 Standards in parentheses apply to vehicles sold in specified high altitude counties. Vehicles eligible for a carbon monoxide waiver to 7.0 gpm at low altitude are eligible for a waiver to 11 gpm at high altitude.

11 Standards in parentheses apply to vehicles sold in specified high altitude counties.

gpm - grams per mile
CID - cubic inch displacement
CVS-72 - constant volume sample cold start test
CVS-75 - constant volume sample test which includes cold and hot starts
7-mode - 137 second driving cycle test
ppm - parts per million

### A.1.2 Light Duty Trucks

The following standards, up through 1975, apply only to gasoline powered light duty trucks. Standards for 1976 and later apply to both gasoline and diesel powered light duty trucks[1].

| Year | Test Procedure[2] | Hydro-carbons | Carbon Monoxide | Oxides of Nitrogen | Partic-ulates[3] | Evaporative[4] Hydrocarbons |
|---|---|---|---|---|---|---|
| Prior | 7-mode | 850 ppm | 3.4% | 1000 ppm | - | - |
| to | 7-mode | 11 gpm | 80 gpm | 4 gpm | - | - |
| controls | CVS-75 | 8.8 gpm | 87.0 gpm | 3.6 gpm | - | - |
| 1968-69 | 7-mode | | | | | |
| | 50-100 CID | 410 ppm | 2.3% | - | - | - |
| | 101-140 CID | 350 ppm | 2.0% | - | - | - |
| | over 140 CID | 275 ppm | 1.5% | - | - | - |
| 1970 | 7-mode | 2.2 gpm | 23 gpm | - | - | - |
| 1971 | 7-mode | 2.2 gpm | 23 gpm | - | - | 6.0 g/test[5] |
| 1972 | CVS-72 | 3.4 gpm | 39 gpm | - | - | 2.0 g/test |
| 1973-74 | CVS-72 | 3.4 gpm | 39 gpm | 3.0 gpm | - | 2.0 g/test |
| 1975-77[6] | CVS-75 | 2.0 gpm | 20 gpm | 3.1 gpm | - | 2.0 g/test |
| 1978 | CVS-75 | 2.0 gpm | 20 gpm | 3.1 gpm | - | 6.0 g/test |
| 1979-80[7] | CVS-75 | 1.7 gpm | 18 gpm | 2.3 gpm | - | 6.0 g/test |
| 1981 | CVS-75 | 1.7 gpm | 18 gpm | 2.3 gpm | - | 2.0 g/test |
| 1982-83[8] | CVS-75 | 1.7 gpm<br>(2.0) | 18 gpm<br>(26) | 2.3 gpm<br>(2.3) | 0.6 gpm<br>(-) | 2.0 g/test<br>(2.6) |
| 1984-86[9] | CVS-75 | 0.8 gpm<br>(1.0) | 10 gpm<br>(14) | 2.3 gpm<br>(2.3) | 0.6 gpm<br>(-) | 2.0 g/test<br>(2.6) |
| 1987 & later[9] | CVS-75 | 0.8 gpm<br>(1.0) | 10 gpm<br>(14) | 1.2 gpm<br>(1.2) | 0.26 gpm<br>(-) | 2.0 g/test<br>(2.6) |

## LIGHT DUTY TRUCKS

1 Standards do not apply to trucks with engines less than 50 CID from 1968 through 1974.

2 Different test procedures have been used since the early years of emission control which vary in stringency. The appearance that the standards were relaxed from 1971 to 1972 is incorrect. The 1972 standards are actually more stringent because of the 1972 test procedure.

3 Applies only to diesels.

4 Evaporative emissions determined by carbon trap method through 1977, SHED procedure beginning in 1978. Applies only to gasoline fueled trucks.

5 Evaporative standard does not apply to off-road utility trucks for 1971.

6 Trucks sold in specified high altitude counties required to meet standards at high altitude (1977 only).

7 Effective in 1979, light duty truck classification was extended from 0-6,000 pounds GVWR to 0-8,500 pounds GVWR.

8 Standards in parentheses apply to trucks sold in specified high altitude counties.

9 Standards in parentheses apply to trucks sold in specified high altitude counties.

gpm - grams per mile
CID - cubic inch displacement
CVS-72 - constant volume sample cold start test
CVS-75 - constant volume sample test which includes cold and hot starts
7-mode - 137 second driving cycle test
ppm - parts per million
GVWR - gross vehicle weight rating

### A.1.3 Heavy Duty Gasoline Powered Engines and Vehicles

The following is a summary of gasoline powered heavy duty engine and vehicle standards[1].

| Year | Hydrocarbons | Carbon Monoxide | Oxides of Nitrogen | Hydrocarbons + Oxides of Nitrogen | Evaporative Hydrocarbons[2] |
|---|---|---|---|---|---|
| 1970-73 | 275 ppm | 1.5% | - | - | - |
| 1974-78 | - | 40 g/bhp-hr | - | 16 g/bhp-hr | - |
| 1979[3,4,5] | 1.5 g/bhp-hr | 25 g/bhp-hr | - | 10 g/bhp-hr | - |
| | 1.0 g/bhp-hr | 25 g/bhp-hr | - | 9.5 g/bhp-hr | - |
| | - | 25 g/bhp-hr | - | 5 g/bhp-hr | - |
| 1980-84[3] | 1.5 g/bhp-hr | 25 g/bhp-hr | - | 10 g/bhp-hr | - |
| | - | 25 g/bhp-hr | - | 5 g/bhp-hr | - |
| 1985-86 | 2.5 g/bhp-hr | 40.0 g/bhp-hr | 10.7 g/bhp-hr | - | 3.0 g/test<br>4.0 g/test[6] |
| 1987 & later[7] | 1.3 g/bhp-hr | 15.5 g/bhp-hr | 6.0 g/bhp-hr | | 3.0 g/test |
| | 2.5 g/bhp-hr | 40.0 g/bhp-hr | 6.0 b/bhp-hr | | 4.0 g/test |

---

[1] Test procedure for 1970-1983 standards is the 9-mode test procedure. Test procedure for 1985 and later is the transient test procedure although manufacturers may use the 9-mode test with an alternate set of standards (not shown).

[2] Evaporative emissions determined by the SHED procedure.

[3] Manufacturers may chose among the set of standards listed.

[4] Standards of 1.0 HC, 25 CO, and 9.5 NOx are used if NDIR HC measurement method is used.

[5] Effective in 1979, heavy duty vehicle classification was changed from 6,001 pounds and greater GVWR to 8,501 pounds and greater GVWR.

[6] 3.0 g standard applies to HDGV's less than 14,000 lbs. GVW, and 4.0 g standard applies to HDGV's over 14,000 lbs.

[7] The 1.3/15.5/6.0/3.0 standards apply to HDGV's less than 14,000 lbs. GVW, the 2.5/40.0/6.0/4.0 standards apply to trucks over 14,000 lbs. GVW.

NOTE: g/bhp-hr = grams per brake horsepower-hour
ppm = parts per milion

## A.1.4 Heavy Duty Diesel Powered Engines and Vehicles

The following is a summary of diesel powered heavy duty engine and vehicle standards[1].

| Year | Hydro-carbons | Carbon Monoxide | Oxides of Nitrogen | Hydro-carbons + Oxides of Nitrogen | Partic-ulates | Smoke |
|---|---|---|---|---|---|---|
| 1970-73 | - | - | - | - | - | ACCEL 40%<br>LUG 20%<br>opacity |
| 1974-78 | - | 40g/bhp-hr | - | 16g/bhp-hr | - | ACCEL 20%<br>LUG 15%<br>PEAK 20%<br>opacity |
| 1979-84[2,3] | 1.5g/bhp-hr<br>0.5g/bhp-hr | 25g/bhp-hr<br>15.5g/bhp-hr | 9.0g/bhp-hr | 10g/bhp-hr - | - | ACCEL 20%<br>LUG 15%<br>PEAK 50%<br>opacity |
| 1985-86[3] | 1.3g/bhp-hr | 15.5g/bhp-hr | | 10.7g/bhp-hr | - | ACCEL20%<br>LUG 15%<br>PEAK 50%<br>opacity |
| 1987 & later | 1.3g/bhp-hr | 15.5g/bhp-hr | 6.0g/bhp-hr | - | - | ACCEL 20%<br>LUG 15%<br>PEAK 50%<br>opacity |

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[1] Test procedure for 1970-1983 standards is the 13-mode test procedure. Test procedure for 1985 and later is the transient test procedure. Both test procedures measure in grams per brake horsepower-hour.

[2] Effective in 1979 the heavy duty vehicle classification was changed from 6,001 pounds and greater GVWR to 8,501 pounds and greater GVWR.

[3] Standards of 0.5 HC, 15.5 CO, and 9.0 NOx are optional standards for 1984 diesels tested on the 13-mode test procedure.

g/bhp-hr - grams per brake horsepower-hour
ppm - parts per million

### A.1.5 Motorcycles

The following is a summary of motorcycle standards.

| Year | Displacement[1] | Hydrocarbons | Carbon Monoxide |
|---|---|---|---|
| 1978-79 | 50-169 | 5.0 g/km | 17 g/km |
| | 170-749 | 5.0 + 0.0155(D-170) g/km[2] | 17 g/km |
| | 750 & larger | 14 g/km | 17 g/km |
| 1980 & later | All (50 & larger) | 5.0 g/km | 12 g/km |

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[1] Displacement shown in cubic centimeters

[2] Motorcycle Hydrocarbon Formula

D = engine displacement in cubic centimeters
e.g., 300 cc engine --
HC Standard = (300-170) X .0155 + 5.0 = 7.0 g/km

g/km - grams per kilometer

# Appendix B

## CALCULATION OF THE VMT MIX

The proportion of the total vehicle-miles-traveled (VMT) driven by a given vehicle type depends entirely on (a) the number of vehicles, (b) the model year registration distribution, and (c) the mileage accumulation rate distribution. Also, as light duty diesel powered vehicles and trucks become a larger proportion of their respective fleets, their VMT proportions will increase. As the diesel powered vehicle type VMT fractions increase, the corresponding gasoline powered vehicle type VMT fractions will decrease.

The MOBILE3 computer program calculates the VMT mix unless a user inputs locality specific information. The calculation procedure is based on the estimated number of vehicles and the average annual miles driven for each vehicle type. The product of these two variables estimates the total miles driven on January 1 of a calendar year for each vehicle type. By performing this calculation for each vehicle type and summing the results, the total miles driven on January 1 for the entire highway mobile source fleet are estimated. Finally, by normalizing the individual vehicle type total miles, the VMT fractions are estimated.

Specifically, the MOBILE3 computer program performs the calculations in subprogram TFCALX with the following equations:

MILES(IV) = VCOUNT(IV)*GSFVCT(IV)*TFNORM(IV)
TOTVMT = SUMiv[MILES(IV)]
VMTMIX(IV) = MILES(IV)/TOTVMT

where

TOTVMT = the total miles traveled by the entire highway mobile source fleet.

IV = the vehicle type index (1 = LDGV, 2 = LDGT1, 3 = LDGT2, 4 = HDGV, 5 = LDDV, 6 = LDDT, 7 = HDDV, and 8 = MC).

VMTMIX(IV) = the estimated VMT fraction for vehicle type IV.

VCOUNT(IV) = the estimated vehicle count for vehicle type IV based on 1981 registrations. To use the dieselization rates, VCOUNT(1) = VCOUNT(5) and VCOUNT(2) + VCOUNT(3) = VCOUNT(6). This implies that the LDDVs and LDGVs are combined to become the light duty vehicle fleet. Similarly, the LDGT1s, LDGT2s and LDDTs are combined to become the light duty truck fleet. Both the light duty vehicle and truck fleets are adjusted by fleet sales fractions to separate the diesel from the gasoline powered vehicles/trucks.

GSFVCT(IV) = fraction of each total (gas + diesel) vehicle counts that are either gas or diesel. GSFVCT (1) = DAF (1)/(DAF(1) + DAF(5)), where DAF is the fleet sum of the product of the registration distribution and the diesel sales fractions by model year in a given calendar year. The DAF values change with calendar year. For an example of how the DAF values are estimated, refer to the .5 tables in Appendix H. For the gas/diesel sales fractions for each model year of LDVs and LDTs refer to Table B.1.

TFNORM(IV) = the registration weighted average of annual miles driven by each vehicle of vehicle type IV. The values are illustrated in each table .5 of Appendix H (denoted as TFNORM at the bottom of the C*D column).

MILES(IV) = the estimated miles driven by vehicle type IV.

SUMiv = the summation over the eight vehicle types.

An example of the VMT mix calculation follows. This example is based on information readily available. Using the example travel weighting factor calculation tables and the 1981 registration counts[1], the VMT mix example for January 1, 1988 is as follows:

VCOUNT(1) = 105,839,000
VCOUNT(2) = 18,072,000
VCOUNT(3) = 11,506,000

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[1] EPA Report, "Fleet Characterization Data Used for MOBILE3" August,1984, EPA-AA-TEB-84-6

VCOUNT(4) = 4,650,000
VCOUNT(5) = 105,839,000
VCOUNT(6) = 29,578,000
VCOUNT(7) = 1,640,000
VCOUNT(8) = 5,600,000

GSFVCT(1) = 0.902/(.902 + .044) = .954
GSFVCT(2) = 0.876/(.876 + .080) = .916
GSFVCT(3) = 0.876/(.876 + .080) = .916
GSFVCT(4) = 1.000
GSFVCT(5) = 0.044/(.902 + .044) = .046
GSFVCT(6) = 0.080/(.876 + .080) = .083
GSFVCT(7) = 1.000
GSFVCT(8) = 1.000

TFNORM(1) = 9,518.0
TFNORM(2) = 10,909.0
TFNORM(3) = 11,245.4
TFNORM(4) = 13,015.0
TFNORM(5) = 10,871.3
TFNORM(6) = 14,765.6
TFNORM(7) = 45,860.0
TFNORM(8) = 1,924.0

MILES(1)= (105,839,000)*( .954)*( 9,518.0) = 9.61 x $10^{11}$ miles
MILES(2)= ( 18,072,000)*( .916)*(10,909.0) = 1.81 x $10^{11}$ miles
MILES(3)= ( 11,506,000)*( .916)*(11,245.4) = 1.19 x $10^{11}$ miles
MILES(4)= ( 4,650,000)*(1.000)*(13,015.0) = 0.61 x $10^{11}$ miles
MILES(5)= (105,839,000)*( .046)*(10,871.3) = 0.53 x $10^{11}$ miles
MILES(6)= ( 29,578,000)*( .083)*(14,765.6) = 0.36 x $10^{11}$ miles
MILES(7)= ( 1,640,000)*(1.000)*(45,860.0) = 0.75 x $10^{11}$ miles
MILES(8)= ( 5,600,000)*(1.000)*( 1,924.0) = 0.11 x $10^{11}$ miles

Total 14.97 x $10^{11}$ miles

VMTMIX(1) = 9.61/14.97 = .648
VMTMIX(2) = 1.81/14.97 = .122
VMTMIX(3) = 1.19/14.97 = .080
VMTMIX(4) = 0.61/14.97 = .041
VMTMIX(5) = 0.53/14.97 = .036
VMTMIX(6) = 0.36/14.97 = .021
VMTMIX(7) = 0.75/14.97 = .050
VMTMIX(8) = 0.11/14.83 = .008

## Table B.1

### Gasoline/Diesel Sales Fractions for LDVs and LDTs
### (used in MOBILE3 also)

| MODEL YEAR | LDGV | LDDV | LDGT (1&2) | LDDT |
|---|---|---|---|---|
| Pre-1974 | 1.000 | 0.000 | 1.000 | 0.000 |
| 1975 | 0.997 | 0.003 | 0.998 | 0.002 |
| 1976 | 0.997 | 0.003 | 0.997 | 0.003 |
| 1977 | 0.996 | 0.004 | 0.995 | 0.005 |
| 1978 | 0.991 | 0.009 | 0.991 | 0.009 |
| 1979 | 0.972 | 0.028 | 0.972 | 0.028 |
| 1980 | 0.966 | 0.034 | 0.966 | 0.034 |
| 1981 | 0.939 | 0.061 | 0.940 | 0.060 |
| 1982 | 0.954 | 0.046 | 0.920 | 0.080 |
| 1983 | 0.947 | 0.053 | 0.900 | 0.100 |
| 1984 | 0.940 | 0.060 | 0.870 | 0.130 |
| 1985 | 0.934 | 0.066 | 0.840 | 0.160 |
| 1986 | 0.927 | 0.073 | 0.820 | 0.180 |
| 1987 | 0.920 | 0.080 | 0.790 | 0.210 |
| 1988 | 0.910 | 0.090 | 0.760 | 0.240 |
| 1989 | 0.900 | 0.100 | 0.730 | 0.270 |
| 1990 | 0.887 | 0.113 | 0.706 | 0.294 |
| 1991 | 0.887 | 0.113 | 0.697 | 0.303 |
| 1992 | 0.886 | 0.114 | 0.688 | 0.312 |
| 1993 | 0.886 | 0.114 | 0.679 | 0.321 |
| 1994 | 0.885 | 0.115 | 0.670 | 0.330 |
| 1995+ | 0.885 | 0.115 | 0.661 | 0.339 |

## Appendix C

## CALCULATION PROCEDURE TO COMBINE THE EMISSION RESULTS OF THE TWO LIGHT DUTY GASOLINE POWERED TRUCK CLASSES

Frequently air quality analyses require the use of one light duty gasoline powered truck vehicle type as opposed to two. However, emission factors are presented for two truck types: LDGT1 and LDGT2. As a result, a procedure has been developed which will combine the two truck types. This appendix describes this procedure. The procedure simply combines the calculated emission factors of each truck type on the basis of VMT. To illustrate this, a hypothetical example is used.

Suppose that on January 1, 1988, the LDGT1 and LDGT2 calculated CO emission factors are 39.3 and 43.4 grams/mile; respectively. Further, assume that the LDGT1 and LDGT2 proportions of the total fleet VMT are 12.2 percent and 8.0 percent; respectively. Finally assume that the entire fleet travels 14.83 x $10^{11}$ miles.

From this example the combined truck types travel the following miles on January 1, 1988:

$$(14.83 \times 10^{11} \text{ miles})*(.122) + (14.83 \times 10^{11} \text{ miles})\ (.080)$$

Further, the total grams emitted by the combined truck types are as follows:

$$(1.81 \times 10^{11} \text{ miles})(39.3 \text{ g/mi}) + (1.19 \times 10^{11} \text{miles})*(43.4\text{g/mi})$$

As a result, the calculated CO gram/mile emission factor estimate for the combined truck type is as follows (total grams/total miles):

$$\frac{(14.83\text{x}10^{11}\text{miles})(.122)(39.3\text{g/mi}) + (14.83\text{x}10^{11}\text{miles})(.080)(43.\text{g/mi})}{(14.83 \times 10^{11} \text{ miles})\ (.122) + (14.83 \times 10^{11}\text{miles})\ (.080)}$$

or,

$$\frac{(.122)\ (39.3 \text{ g/mi}) + (.080)\ (43.4 \text{ g/mi})}{(.122) + (.080)} = 40.9 \text{ gm/mi}$$

After simplifying the equation it becomes obvious that the combined LDGT vehicle type is a function of the calculated emission factors and the VMT fractions. The more generalized formula is as follows:

$$\frac{\text{VMT(LDGT1)} \times \text{EF(LDGT1)} + \text{VMT(LDGT2)} \times \text{EF(LDGT2)}}{\text{VMT(LDGT1)} + \text{VMT(LDGT2)}}$$

## Appendix D

## METHODOLOGY FOR CALCULATING JANUARY 1 TRAVEL WEIGHTING INFORMATION AND FLEET AVERAGE MILEAGE ACCUMULATION

This appendix describes the derivation of January 1 registration distributions, the annual rate of mileage accrual for the fleets, and the fleet average mileage accumulation distributions. The January 1 registration and annual rate of mileage accrual distributions are used in the calculation of travel weighting fractions. The fleet average mileage accumulation distributions are used to estimate the January 1 emission levels by model year.

### D.1 JANUARY 1 TRAVEL WEIGHTING INFORMATION

The travel weighting fractions for a given vehicle type are the individual model year proportions of the total VMT for the vehicle type. To generate the travel weighting fractions, typically three distributions are required: (1) the annual mileage accrual rate per vehicle by age distribution, (2) the registration distribution, and (3) the fleet sales fraction distribution (to account for the influx of diesels).

### D.1.1 January 1 Registration Distribution Transformations

A portion of the January 1 travel fraction calculation procedure is to estimate the January 1 model year registration distribution for each vehicle type. The model year registration distribution, frequently referred to as the registration mix, begins with all model years combined for a given vehicle type and apportions them into their appropriate model year index (except for model year index 20 which represents all model years that were built 20 or more model years ago). At this phase of the registration mix development, the LDV and LDT model year registration distributions are composed of both the gasoline and diesel powered vehicle types.

For the EPA MOBILE3 computer program, the initial model year registration distributions are assumed to be based on July 1 data. This July 1 information is then transformed into January 1 model year registration distributions. For vehicle types where model year sales are assumed to begin on October 1 (light duty vehicles and trucks), the original July 1 model year registration distribution accounts for approximately 75 percent of the current model year fleet. Using the assumption of uniform sales throughout the year, approximately 25 percent would have been sold by January 1 (or one-third of the July 1 registration). The older model year registration figures are six months older on July 1 than they are on January 1. However, no direct adjustment are made to these older model year registration figures. Although the difference between January 1 and July 1 for the older model vehicles is primarily scrappage, the older model year registration figures are adjusted later.

Denoting the July 1 registration fractions as R(1), R(2), R(3), . . ., R(20+), we can generalize the January 1 light duty adjustment equations as follows:

FIRST MODEL YEAR INDEX: 1/3*R(1)
SECOND AND LATER MODEL YEAR INDEX: R(i), i=2, 3, . . ., 20+

The second type of adjustment for the January 1 model year registration distributions is to account for the fleet sales fractions: The separation of the model year sales into diesel and gasoline powered vehicle types. The fleet sales fractions are given in Table B.1 of Appendix B. As a result, the January 1 model year registration distributions are adjusted according to the following formulation:

FIRST MODEL YEAR INDEX: 1/3*R(1)*F(my)
SECOND AND LATER INDEX: R(i)*F(my-i+1)

F(my) is the fraction of the model year sales which are gasoline powered, if calculating the LDGV or LDGT registration distributions. F(my) is the fraction of the model year sales which are diesel powered, if calculating the LDDV or LDDT registration distributions.

The last adjustment to estimate the January 1 model year registration distributions is to normalize the distribution such that the fractions sum to one. To accomplish this adjustment, the following procedure is used:

DAF = SUMi[P(i)*R(i)*F(my-i+1)]

where P(1) = 1/3
P(i) = 1 i = 2, 3, . . ., 20+
R(i) = July 1 registration figures
i = 1, 2, 3, . . ., 20+

F(my-i+1) = the fleet sales fraction for model year my-i+1

and SUMi = the summation over the 20 model years.

Then each January 1 registration P(i)*R(i)*F(my-i+1) figure is divided by DAF to estimate the January 1 registration mix.

For vehicles whose model year sales begins on January 1 (heavy duty vehicles and motorcycles), there are two changes to the above normalization procedure. P(1) should be set to zero and every F(my-i+1) term should be set to 1.

### D.1.2 January 1 Annual Rate of Mileage Accrual for the Fleet

The last aspect of calculating the travel weighting fractions is determination of the January 1 annual rate of mileage accrual. The methodology for calculating the average mileage accumulation rate will be explained by the following example: Calculation of the average annual mileage accumulation rate for the 1985 model year (MY) vehicles on January 1 of 1985, 1986, 1987 and later years.

First the average annual mileage accumulation rate of the 1985 MY light duty vehicles on January 1, 1985, will be calculated (the calendar year when the vehicle model year index is one). It is assumed that mileage accrual is uniform throughout the year and that 1985 light duty model year sales begin on October 1, 1984.

Using these assumptions, it is obvious that by January 1, 1985, all 1985 MY vehicles are less than one year old and accumulate mileage at the first year rate. The annual rates of mileage accural are presented in table .4 of Appendix H for each vehicle type. For the light duty gasoline powered vehicles, the annual mileage accrual rate for vehicles during their first year is 12,818 miles.

By January 1, 1986, those vehicles that had been sold by January 1, 1985 have been on the road for an additional year and accumulate mileage at the second year annual rate of 12,102 miles.

In addition to the 1985 model year vehicles sold before January 1, 1985, those 1985 MY vehicles sold after January 1 and before October 1, 1985, must be considered. Again by assuming uniform sales, approximately 75 percent of the 1985 model year vehicles are sold after January 1, 1985. Further, on January 1, 1986 these vehicles are still in their first year of mileage accumulation and are accumulating mileage at a 12,818 mile annual rate.

Since the first group represents three months of sales and the second group represents nine months of sales, the average annual mileage accrual rate of 1985 MY vehicles on January 1, 1986 can be expressed as follows:

$$(.25)*(12,102) + (.75)*(12,818)$$

By extension, the formula for the average mileage accumulation rate of the 1985 MY vehicles on January 1, 1987 is as follows:

(.25)*(11,427) + (.75)*(12,102)

Denoting the average annual rate of mileage accrual during the first, second, and third year as M(1), M(2), and M(3); respectively, the generalized average annual mileage accumulation rate equations on January 1 are as follows:

FIRST MODEL YEAR INDEX: M(1)
SECOND MODEL YEAR INDEX: .25*M(2) + .75*M(1)
THIRD MODEL YEAR INDEX: .25*M(3) + .75*M(2)
Ith MODEL YEAR INDEX: .25*M(i) + .75*M(i-1)

For the vehicle types whose model year sales begin on January 1 (heavy duty vehicles and motorcycles) the generalized formulae are as follows:

FIRST MODEL YEAR INDEX: 0
Ith MODEL YEAR INDEX: M(i-1)

## D.2 JANUARY 1 FLEET AVERAGE MILEAGE ACCUMULATION

To estimate the emission levels on January 1 for each model year (as in tables .2A through .2C for each vehicle type), the annual mileage accrual rate per vehicle by age distribution is used to derive the fleet average mileage accumulation distribution.

The methodology for calculating the average January 1 fleet cumulative mileages will be explained by example: Calculation of the average cumulative mileage for the 1985 model year (MY) vehicles on January 1 of 1985, 1986, 1987, and later years.

First, we calculate the average fleet cumulative mileage of the 1985 MY LDGVs on January 1, 1985 (the calendar year when the vehicle model year index is defined as one).

We assume vehicle sales are uniform throughout the year, the mileage accrual is uniform throughout the year, and the 1985 model year sales begin on October 1, 1984.

Using these assumptions, it is obvious that by January 1, 1985 (25 percent of the way through the sales year), approximately 25% of the 1985 model year vehicles will be sold. These vehicles range in age from 0 to 3 months. Assuming uniform sales, their average age is 1.5 months.

Therefore, the average mileage accrual for these 1985 MY vehicles which have been sold by January 1, 1985, is 1.5/12, or .125, times the annual rate of mileage accrual for the first year. The annual rates of mileage accrual are presented in table .4 and .5 for each vehicle type. For LDGVs the annual mileage accrual rate for vehicles during their first year is 12,818 miles.

By January 1, 1986, those vehicles sold before January 1, 1985 have been on the road for an additional year. Therefore, those vehicles have accumulated mileage for 1+(1.5/12) years, or 1.125 years. Referring to table .4 for the annual rates of mileage accrual, we can calculate the average cumulative mileage of these vehicles as the sum of the first year's mileage (12,818 miles) plus .125 times the second year annual rate (12,102 miles).

In addition to the 1985 model year vehicles sold before January 1, 1985, we must consider those 1985 MY vehicles sold between January 1, 1985 and September 30, 1985. If we again assume uniform sales, then by January 1, 1986 these vehicles range in age from 3 months to 12 months, with an average age of 7.5 months. Since these vehicles are still in their first year of use on January 1, 1986, their average mileage accumulation on that date is 7.5/12, or .625, times 12,818 miles.

The average cumulative mileage of all 1985 MY vehicles on January 1, 1986 is the sales weighted average of the cumulative mileages for these two groups of vehicles (those sold before January 1 and those sold after January 1).

Since the first group represents three months of sales and the second group represents nine months of sales, the weighted average cumulative mileage of 1985 MY vehicles on January 1, 1986 can be expressed as follows:

.25*[12818 + .125*12102] + .75*[.625*12818]

By extension, the formula for the cumulative mileage of 1985 model year vehicles on January 1, 1987 is given by:

.25*[12818 + 12102 + .125*11427 + .75*[12818 + .625*12102].

Denoting the average rate of mileage accumulation during the first, second, and third years as M(1), M(2), and M(3), we can generalize the equations for cumulative mileage on January 1 as follows:

FIRST YEAR: .125*M(1)
SECOND YEAR: .25*[M(1) + .125*M(2)] + .75*[.625*M(1)]
THIRD YEAR: M(1)+.25*[M(2)+.125*M(3)]+.75*[.625*M(2)]
Ith YEAR: M(1)+M(2)+...+M(i-2)+.25*[M(i-1)+.125*M(i)]+.75*[.625*M(i-1)]

For vehicles whose sales year begins on January 1 (heavy duty vehicles and motorcycles) the formulae are modified as follows:

FIRST YEAR: 0
SECOND YEAR: .5*M(1)
THIRD YEAR: M(1) + M(2) + ... + M(i-2) + .5*M(i-1)

## Appendix E

## METHOD FOR DETERMINING EXCESS EMISSIONS DUE TO TAMPERING AND MISFUELING

### E.1 Background

Since 1978, EPA has conducted surveys of in-use vehicles, passenger cars and trucks in over seventeen states. During these surveys, EPA collected data regarding emission component disablements and misfueling from over 8,000 vehicles. One of these surveys, completed in 1982, collected data from nearly 3,000 cars in ten states. This 1982 survey was chosen as the data base with which to calculate current and future tampering rates for MOBILE3.

In order to estimate the excess emissions caused by tampering and misfueling on a future date, it is necessary to predict the tampering and misfueling rates when the average age of the vehicles will be older than that observed in the 1982 survey. Examination of the data from the 1982 survey shows a marked increase in misfueling rates, and in the tampering rates of some components, as the average mileage of the sample increases.

To examine this issue, a linear regression equation on mileage was fit to data from the 1982 EPA survey and this equation appears to reasonably explain the tampering and misfueling rates observed in the surveys. Each linear equation is defined by a zero mile rate and an increase in the rate for every 10,000 miles of fleet average mileage. Other non-linear equations did not seem to better explain the increase. It was decided, therefore, to use the linear equation to estimate the tampering and misfueling rates using standard EPA predictions of the average age in miles of each model year on that date.

Least squares regression was used to estimate a line of the form $Y = BX + A$, where Y is the proportion of tampered vehicles at mileage X. The data used to generate estimates of the regression coefficients, A and B, were the mileage and whether the vehicle was tampered ($Y=1$) or not ($Y=0$) for each vehicle in the 1982 tampering survey.

The regression coefficients for various types of tampering are shown in Table E-1. In Table E-1, some linear equations contain negative zero mile rates. Since these negative levels are small, no effort has been made to force the equation through zero. However, if a tampering or misfueling rate for a particular model year is calculated to be less than zero in the evaluation year, that rate is set to zero.

Also in Table E-1, overlap among tampering types is ignored, thus one car can contribute to several of the regression equations. The overall tampering rate at a given mileage is therefore less than the sum of these equations. However, when estimating the excess emissions due to tampering, it is necessary to explicitly account for vehicles with more than one form of tampering, since tampering effects are not always additive. The following sections will describe how this was done for each case.

## E.2 Discussion of Method

The approach used begins with a single model year's vehicles. The calculation described below is performed for each of the last 19 model years, resulting in a total emissions impact for each from all forms of tampering combined. These 19 model year-specific impacts are then added using age-based vehicle miles traveled (VMT) fractions as weighting factors to arrive at the impact on the composite emissions of, for example, passenger cars of all ages.

The description below is for passenger cars, but the same procedure can be used for light-duty trucks by substituting any truck-specific tampering rates, emission impacts, etc.

The calculation consists of the following steps for each model year:

A. Separate the model year into subgroups with distinct combinations of equipment, such that all cars in a subgroup are susceptible to the same types of tampering. Specifically, cars with air pumps and catalysts must be separated from cars with only air pumps and cars with only catalysts, since simultaneous air pump and catalyst tampering is possible for one subgroup but not the others. The sales fraction for each of these subgroups must be known; the necessary fractions are given in Tables E-2a and 2b. Because in a single model year all cars either have or do not have PCV and evaporative controls, and because the impacts of PCV and evaporative tampering are strictly additive to the impacts of misfueling, catalyst removal, and air pump disablement, there is no need to define subgroups based on PCV and evaporative equipment.

B. Identify all the unique combinations of tampering that can occur on cars in each subgroup. These are as follows:

| | Air Pump/Catalyst | Catalyst Only | Air Pump Only |
|---|---|---|---|
| 1. | Air Pump/Catalyst | | |
| 2. | Air Pump/Misfueling(Inlet) | | |
| 3. | Air Pump/Misfueling(Other) | | |
| 4. | Air Pump/Catalyst/Misfueling(Inlet) | | |
| 5. | Air Pump/Catalyst/Misfueling(Other) | | |
| 6. | Catalyst/Misfueling(Inlet) | X | |
| 7. | Catalyst/Misfueling(Other) | X | |
| 8. | Air Pump Only | | X |
| 9. | Catalyst Only | X | |
| 10. | Misfueling(Inlet) Only | X | |
| 11. | Misfueling(Other) Only | X | |

In the above list, "Inlet" designates habitual misfueling accompanied by tampering of the inlet restrictor. "Other" designates habitual misfueling accomplished by other means, such as a small pump nozzle or a funnel. As before, PCV and evaporative tampering can be kept separate.

C. Find the percentage of vehicles with each of the above unique combinations of tampering on the evaluation date assuming no special program to reduce tampering and misfueling. Since the tampering rates derived in Table E-1 depend on mileage, the odometer of the model year on the evaluation date (always January 1) must be known. The mileage accumulation rate for LDGVs is given in Table 1.1.4 (Appendix H). Given an odometer value, the equations from Table E-1 can be used to calculate the overall air pump rate (AIR), catalyst removal rate (CAT), the rate of misfueling via inlet tampering (INLET), and the rate of misfueling via other means (OTHER). These overall tampering rates are the sum of the rates for two or more of the above unique combinations of tampering. To calculate the individual rate for each unique combination, additional assumptions are necessary. To fill this need, EPA has assumed that the rate for a given overlap combination is always proportional to the overall rate of one or the other of the forms of tampering that make up the overlap combination.

For example, EPA has had to assume that the rate of simultaneous air pump and catalyst tampering is 6.6% of the overall air pump tampering rate, regardless of any local variation in overall air pump tampering rate or overall catalyst tampering rate. (The figure of 6.6% was determined from the 1982 Tampering Survey data.) An exception is made if necessary to prevent a logical contradiction; in the example given, the rate of simultaneous air pump and catalyst tampering is never assumed to be larger than the overall rate of catalyst or air pump tampering. Similar assumptions are made for other overlap combinations. The full set of assumptions is as follows:

Rate (1) = .066 x AIR
Rate (2) = .111 x AIR
Rate (3) = .105 x AIR
Rate (4) = .238 x CAT
Rate (5) = .032 x CAT
Rate (6) = .441 x CAT
Rate (7) = .050 x CAT
Rate (8) = AIR - (1,2,3,4,5)
Rate (9) = CAT - (1,4,5,6,7)
Rate (10) = INLET - (2,4,6)
Rate (11) = OTHER - (3,5,7)

As mentioned, alterations are made as necessary to prevent logical contradictions that would otherwise result in one or more of the last four rates being negative. PCV and evaporative tampering rates come directly from the equations in Table E-1.

D. Assign each unique combination of tampering an emissions impact per vehicle. The impacts are taken from Table E-3a and E-3b, with the following further assumptions regarding cases of simultaneous tampering.

The impact of simultaneous catalyst removal and of misfueling and/or air pump tampering is the same as stated in Table E-3a for catalyst removal alone.

The impact of simultaneous misfueling and air pump tampering is the same as stated in Table 3a for misfueling alone.

E. Multiply tampering rate by tampering impact for each unique combination, and add the result for all combinations taking into account the sales split between the air pump only subgroup, the air pump/catalyst-equipped subgroup and the catalyst-only subgroup. Add to this the rate-times-impact result for PCV and evaporative tampering. The sum is the excess emissions due to the tampering and misfueling.

Composite excess emissions can be calculated by weighting each model year by its age based VMT fraction, also known as its travel fraction.

The method described above assumes that the user of the result of the calculation is interested in a situation in which vehicles are driven under standard conditions of temperature, speed, etc. All of the emission impacts shown in this document assume such a situation as well. It is possible to analyze other situations if correction factors for non-standard conditions are applied at an appropriate step in the calculation. MOBILE3 does this automatically.

## E.3 Example Calculation

This example will calculate the excess emissions due to tampering and misfueling for the 1977 model year. We will assume that the vehicles are located in a non-I/M area, and we will use the national average tampering and misfueling rates described in Table E-1. We will evaluate all excess emissions for January 1, 1988.

On average, the 1977 model year is estimated to have accumulated 107,558 miles by January 1, 1988. Using this mileage and the rate equations from Table 1, the overall rates of tampering and misfueling can be estimated.

## Table A

### Example Calculation of Tampering and Misfueling Rates*

| | Rate Equations** | | |
|---|---|---|---|
| System | Zero-Mi Level(A) | Increase/ 10K miles(B) | Rate at Eval.*** (107,558 mi (X)) |
| Air Pump | -0.0271 | 0.02652 | 0.2581 |
| Catalyst | -0.0195 | 0.01611 | 0.1538 |
| Fuel Inlet | -0.0143 | 0.02022 | 0.2032 |
| Other Misfueling | 0.0165 | 0.00559 | 0.0766 |
| Evaporative | -0.0048 | 0.00335 | 0.0312 |
| PCV | -0.0002 | 0.00248 | 0.0265 |

---

* Non-I/M area LDGV

** From Table E-1

***Rate = A + B(X/10K)

These overall rates are then used to estimate the size of the 11 overlap categories. Category 12 represents untampered vehicles. These categories do not include PCV and evaporative canister tampering, which are addressed later in this section. For HC and CO excess emissions there are three technology types of interest; air pump only, catalyst only and air pump with catalyst.

Using the equations described in section (C), the 11 category sizes can be determined. These are presented in Table 3. The category sizes for air pump only and catalyst only vehicles can be derived from the rates in Table E-1.

## Table B

## Example Calculation of Overlap Categories*

| Overall Category | Category Description** | Equation*** | Category Size at Evaluation |
|---|---|---|---|
| (1) | AIR/CAT | .066*AIR | .0170 |
| (2) | AIR/INLET | .111*AIR | .0286 |
| (3) | AIR/OTHER | .105*AIR | .0271 |
| (4) | AIR/CAT/INLET | .238*CAT | .0366 |
| (5) | AIR/CAT/OTHER | .032*CAT | .0049 |
| (6) | CAT/INLET | .441*CAT | .0678 |
| (7) | CAT/OTHER | .050*CAT | .0077 |
| (8) | AIR | AIR-(1,2,3,4,5) | .1439 |
| (9) | CAT | CAT-(1,4,5,6,7) | .0198 |
| (10) | INLET | INLET-(2,4,6) | .0702 |
| (11) | OTHER | OTHER-(3,5,7) | .0369 |

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* Catalyst vehicles equipped with air pumps only

** AIR: Air Pump Disabled
CAT: Catalyst Removed
INLET: Misfueling by Enlarging Fuel Filler Inlet
OTHER: Other Misfueling

***Rates for AIR, CAT, INLET, and OTHER from Table A

The excess emissions from this model year (1977) can be estimated from the evaluation date estimates of tampering and misfueling rates from Table A. First, the emission impact of each of the categories must be determined. Since all of the 1977 model year vehicles use oxidation catalyst technology, the emission impact of air pump disablement, catalyst removal and misfueling can be taken directly from Table E-3a. For simplicity, only total HC emissions will be addressed in this example. It is assumed that the effect of catalyst removal supercedes all other tampering and misfueling effects, therefore the overlap categories 1, 4, 5, 6, 7, and 9 which all contain catalyst removal would experience the emission impact of air pump disablement. The overlap categories 2, 3, 10, and 11 which all contain misfueling but without catalyst removal would experience the emission impact of misfueling. Only category 8, which contains only air pump disablements, experiences the air pump disablement emission impact. These emission impact groups are summed in Table C.

The excess emissions due to tampering and misfueling are determined by multiplying the size of each emission impact group times the appropriate excess emission estimate. The three technology types are then weighted by their fleet fractions from Table E-2 and summed for the combined excess emissions from air pump, catalyst, and misfueling. This calculation is presented in Table C.

## Table C

## Example Calculation of Emission Impact

| Technology Type | Emission Impact Groups | Overlap Categories | (A) Emission Impact Group Size | (B) Excess Total HC Emissions (gm/mi) | (C) Technology Fleet Fraction | Composite Emission Impact (A*B*C) |
|---|---|---|---|---|---|---|
| Air Pump With Catalyst | Air Pump Disabled | (8) | .1439 | 1.37 | .20 | .039 |
| | Catalyst Removed | (1,4,5,6,7,9) | .1538 | 3.05 | .20 | .094 |
| | Misfueled | (2,3,10,11) | .1628 | 2.47 | .20 | .080 |
| Air Pump Only | Air Pump Disabled | (1-5,8) | .2581 | 1.37 | .10 | .035 |
| Catalyst Only | Catalyst Removed | (1,4-7,9) | .1538 | 3.05 | .65 | .305 |
| | Misfueled | (2,3,10,11) | .1628 | 2.47 | .65 | .261 |
| | | | Total Emission Impact | | | 0.814 gm/mi |

PCV and evaporative canister tampering effects are assumed not to overlap with any of the other tampering and misfueling effects. As a result, the excess emissions due to these types of tampering can be determined by simply multiplying together the evaluation date rate estimated from Table A and the appropriate excess emissions and technology type fleet fraction from Tables E-2a, E-2b and E-3a. This calculation is presented below. This emission impact for PCV and evaporative canister tampering can be added directly to the emission impacts calculated for other forms of tampering and misfueling in Table C to give an overall impact from tampering and misfueling.

Table D

Example Calculation of Excess Emissions from PCV and Evaporative Cannister Disablements

| System | (A) Tampering Rate Fraction | (B) Excess Total HC Emissions (gm/mi) | (C) Tech. Fleet Size Factor | Composite Emission Impact (A)*(B)*(C) |
|---|---|---|---|---|
| PCV | .026 | 3.44 | 1.0 | .089 |
| Evap | .031 | 1.01 | 1.0 | .031 |
| | | | | .12 gm/mi |

## F.4 Composite of All Model Years

Once an estimate of the excess emissions due to tampering and misfueling has been made for each of the last 19 model years, these estimates are weighted together by the vehicle mileage fraction contribution of each model year to the fleet mileage accumulation. The sum of the weighted excess estimates the composite vehicle excess emissions without an I/M program.

## Table E-1

## Assumed Tampering and Misfueling Rates* Used in MOBILE3

| | LDGV | | LDGT1, LDGT2 & HDGV | |
|---|---|---|---|---|
| Emission Control System | A (Zero Mile Rate) | B (Increase Per 10K Mile) | A (Zero Mile Rate) | B (Increase Per 10k Mile) |
| Non-I/M Areas | | | | |
| Air Pump Disablements | -0.0271 | 0.02652 | 0.0489 | 0.02652 |
| Catalyst Removal | -0.0195 | 0.01611 | 0.1353 | 0.01611 |
| Fuel Inlet Tampering | -0.0143 | 0.02022 | 0.1101 | 0.02022 |
| Other Misfueling | 0.0165 | 0.00559 | 0.0696 | 0.00559 |
| EGR System Disablements | -0.0006 | 0.02199 | 0.0502 | 0.02199 |
| Evaporative Canister | -0.0048 | 0.00335 | 0.0377 | 0.00335 |
| PCV System Disablements | -0.0002 | 0.00248 | 0.0308 | 0.00248 |
| I/M Areas | | | | |
| Air Pump Disablements | -0.0101 | 0.01111 | -0.0100 | 0.01111 |
| Catalyst Removal | -0.0011 | 0.00459 | 0.0332 | 0.00459 |
| Fuel Inlet Tampering | -0.0077 | 0.01000 | 0.0470 | 0.01000 |
| Other Misfueling | 0.0382 | -0.00211 | 0.0699 | -0.00211 |
| EGR System Disablements | -0.0006 | 0.02199 | 0.0502 | 0.02199 |
| Evaporative Canister | -0.0048 | 0.00335 | 0.0377 | 0.00335 |
| PCV System Disablements | -0.0002 | 0.00248 | 0.0308 | 0.00248 |

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* All tampering and misfueling rates were estimated using the results of the FY82 EPA FOSD tampering survey. (EPA-330/1-83-001)

Tampering rate = A + BX, where X = mileage/10K

Table E-2a

Assumed Technology Distribution for Estimating Number of Vehicles Affected by Tampering and Misfueling in MOBILE3

| Description | Model Years | Percent Equipped (%) | | | |
|---|---|---|---|---|---|
| | | LDGV | LDGT1 | LDGT2 | HDGV |
| Air Pump | Pre-1968 | 0 | 0 | 0 | 0 |
| | 1968-1971 | 5 | 5 | 0 | 0 |
| | 1972 | 10 | 10 | 0 | 0 |
| | 1973-1974 | 30 | 30 | 0 | 0 |
| | 1975 | 45 | 40 | 0 | 0 |
| | 1976 | 40 | 40 | 0 | 0 |
| | 1977 | 30 | 30 | 0 | 0 |
| | 1978 | 30 | 30 | 0 | 0 |
| | 1979 | 30 | 50 | 50 | 0 |
| | 1980 | 65 | 50 | 50 | 0 |
| | 1981 | 85 | 50 | 50 | 0 |
| | 1982 | 70 | 50 | 50 | 0 |
| | 1983-1984 | 60 | 50 | 50 | 0 |
| | 1985-1986 | 40 | 50 | 50 | 0 |
| | 1987-2020 | 30 | 50 | 50 | 37 |
| Oxidation Catalyst | Pre-1975 | 0 | 0 | 0 | 0 |
| | 1975 | 80 | 70 | 0 | 0 |
| | 1976 | 85 | 80 | 0 | 0 |
| | 1977 | 85 | 75 | 0 | 0 |
| | 1978 | 90 | 75 | 0 | 0 |
| | 1979 | 90 | 80 | 100 | 0 |
| | 1980 | 88 | 80 | 100 | 0 |
| | 1981 | 13 | 95 | 100 | 0 |
| | 1982 | 13 | 80 | 100 | 0 |
| | 1983 | 13 | 70 | 90 | 0 |
| | 1984-1986 | 0 | 60 | 60 | 0 |
| | 1987-2020 | 0 | 15 | 15 | 74 |
| 3-Way Catalyst | Pre-1980 | 0 | 0 | 0 | 0 |
| | 1980 | 7 | 0 | 0 | 0 |
| | 1981 | 87 | 5 | 0 | 0 |
| | 1982 | 87 | 0 | 0 | 0 |
| | 1983 | 87 | 30 | 10 | 0 |
| | 1984-1986 | 100 | 40 | 40 | 0 |
| | 1987-2020 | 100 | 85 | 85 | 0 |
| EGR System | Pre-1973 | 0 | 0 | 0 | 0 |
| | 1973 | 80 | 80 | 30 | 0 |
| | 1974-1978 | 90 | 90 | 30 | 0 |
| | 1979 | 90 | 100 | 100 | 0 |
| | 1980 | 97 | 100 | 100 | 0 |
| | 1981-1983 | 90 | 100 | 100 | 0 |
| | 1984-1986 | 93 | 100 | 100 | 0 |
| | 1987-2020 | 90 | 100 | 100 | 100 |

## Table E-2b

### Assumed Technology Overlaps for Estimating Number of Vehicles Affected by Tampering and Misfueling in MOBILE3

| | | Percent Equipped (%) | | | |
|---|---|---|---|---|---|
| **Description** | **Model Years** | **LDGV** | **LDGT1** | **LDGT2** | **HDGV** |
| Air Pump with Oxidation or 3-Way Catalyst | Pre-1975 | 0 | 0 | 0 | 0 |
| | 1975-1976 | 30 | 30 | 0 | 0 |
| | 1977 | 20 | 20 | 0 | 0 |
| | 1978 | 25 | 20 | 0 | 0 |
| | 1979 | 25 | 40 | 50 | 0 |
| | 1980 | 65 | 40 | 50 | 0 |
| | 1981 | 85 | 50 | 50 | 0 |
| | 1982 | 70 | 50 | 50 | 0 |
| | 1983-1984 | 60 | 50 | 50 | 0 |
| | 1985-1986 | 40 | 50 | 50 | 0 |
| | 1987-2020 | 30 | 50 | 50 | 37 |
| EGR System with 3-Way Catalyst | Pre-1980 | 0 | 0 | 0 | 0 |
| | 1980 | 7 | 0 | 0 | 0 |
| | 1981 | 85 | 5 | 0 | 0 |
| | 1982 | 85 | 20 | 0 | 0 |
| | 1983 | 85 | 30 | 10 | 0 |
| | 1984-1986 | 93 | 40 | 40 | 0 |
| | 1987-2020 | 90 | 85 | 85 | 0 |
| Evaporative Canister | Pre-1971 | 0 | 0 | 0 | 0 |
| | 1971-1978 | 100 | 100 | 5 | 0 |
| | 1979-1984 | 100 | 100 | 100 | 0 |
| | 1985-2020 | 100 | 100 | 100 | 100 |
| PCV System | Pre-1963 | 0 | 0 | 0 | 0 |
| | 1963-1967 | 0 | 0 | 0 | 0 |
| | 1968-2020 | 100 | 100 | 100 | 100 |

## Table E-3a

## Assumed Emission Impacts Due to Tampering and Misfueling Used in MOBILE3

| (gm/mi) | | Excess Emissions | | | |
|---|---|---|---|---|---|
| Description | Pollutant | FTP | Bag 1 | Bag 2 | Bag 3 |
| Air Pump Disablement (Oxidation Cat) | THC | 1.37 | 1.80 | 1.37 | 1.04 |
| | CO | 30.61 | 34.67 | 33.90 | 21.28 |
| Air Pump Disablement (3-Way Catalyst) | THC | 0.51 | 1.52 | 0.11 | 0.50 |
| | CO | 16.29 | 41.20 | 5.18 | 18.69 |
| Catalyst Removal (Oxidation Cat) | THC | 3.05 | 2.31 | 3.40 | 2.95 |
| | CO | 28.01 | 41.40 | 28.97 | 16.06 |
| Catalyst Removal (3-Way Catalyst) | THC | 1.68 | 1.48 | 1.89 | 1.44 |
| | CO | 17.80 | 23.87 | 18.11 | 12.64 |
| | NOx | 2.16 | 1.66 | 2.27 | 2.34 |
| Habitual Misfueling (Oxidation Cat) | THC | 2.47 | 2.30 | 2.57 | 2.40 |
| | CO | 20.96 | 46.50 | 13.13 | 16.62 |
| Habitual Misfueling (3-Way Catalyst) | THC | 1.57 | 1.44 | 1.77 | 1.30 |
| | CO | 11.30 | 14.49 | 11.32 | 8.86 |
| | NOx | 0.76 | 0.76 | 0.66 | 0.95 |
| EGR Disabled | | | | | |
| Pre-1975 | NOx | 1.21 | 1.40 | 0.96 | 1.54 |
| 3.1 Standard | NOx | 3.31 | 3.82 | 2.63 | 4.21 |
| 2.0 Standard | NOx | 3.48 | 4.11 | 2.68 | 4.53 |
| 1.0 Standard | NOx | 1.23 | 1.36 | 1.19 | 1.21 |
| EGR Disabled & 3-Way Catalyst Removed | NOx | 3.39 | 3.02 | 3.46 | 3.55 |
| EGR Disabled & 3-Way Catalyst Misfueled | NOx | 1.99 | 2.12 | 1.85 | 2.16 |

## Table E-3b

## Assumed Emission Impacts Due to Non-Exhaust Tampering Used in MOBILE3

| | | Excess Crankcase HC Emissions(g/mi) | | | |
|---|---|---|---|---|---|
| Description | Model Years | LDGV | LDGT1 | LDGT2 | HDGV |
| PCV System Disablements | Pre-1963 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 1963-1967 | 3.80 | 3.80 | 0.0 | 0.0 |
| | 1968-1970 | 3.74 | 3.74 | 5.20 | 5.70 |
| | 1971-1974 | 3.51 | 3.51 | 4.88 | 5.70 |
| | 1975-1977 | 3.44 | 3.44 | 4.78 | 5.70 |
| | 1978-1979 | 3.29 | 3.29 | 4.57 | 5.70 |
| | 1980 | 2.83 | 2.83 | 3.93 | 5.70 |
| | 1981-1982 | 2.68 | 2.68 | 3.73 | 5.70 |
| | 1983-2020 | 2.49 | 2.49 | 3.46 | 5.70 |

| | | Excess Hot Soak HC Emissions (grams) | | | |
|---|---|---|---|---|---|
| Description | Model Years | LDGV | LDGT1 | LDGT2 | HDGV |
| Evaporative Canister Disablements | Pre-1971 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 1971 | 6.39 | 6.39 | 0.0 | 0.0 |
| | 1972-1977 | 18.77 | 18.77 | 0.0 | 0.0 |
| | 1978 | 10.85 | 10.85 | 0.0 | 0.0 |
| | 1979-1980 | 10.85 | 10.85 | 10.85 | 0.0 |
| | 1981 | 12.03 | 13.28 | 13.28 | 0.0 |
| | 1982 | 10.85 | 13.28 | 13.28 | 0.0 |
| | 1983 | 9.61 | 13.28 | 13.28 | 0.0 |
| | 1984 | 7.97 | 11.16 | 11.16 | 0.0 |
| | 1985 | 5.18 | 9.03 | 9.03 | 17.28 |
| | 1986 | 5.18 | 6.91 | 6.91 | 17.28 |
| | 1987 | 2.72 | 5.05 | 5.05 | 17.28 |
| | 1988-1989 | 2.72 | 2.72 | 2.72 | 17.28 |
| | 1990-2020 | 1.49 | 1.49 | 1.49 | 17.28 |

| | | Excess Diurnal HC Emissions (grams) | | | |
|---|---|---|---|---|---|
| Description | Model Years | LDGV | LDGT1 | LDGT2 | HDGV |
| Evaporative Canister Disablements | Pre-1971 | 0.0 | 0.0 | 0.0 | 0.0 |
| | 1971 | 16.66 | 16.66 | 0.0 | 0.0 |
| | 1972-1977 | 11.92 | 11.92 | 0.0 | 0.0 |
| | 1978 | 16.04 | 16.04 | 0.0 | 0.0 |
| | 1979-1980 | 16.04 | 16.04 | 16.04 | 0.0 |
| | 1981-1984 | 10.79 | 10.79 | 10.79 | 0.0 |
| | 1985-2020 | 10.79 | 10.79 | 10.79 | 25.54 |

## Appendix F

## CALCULATION PROCEDURE FOR VMT VERSUS AGE DISTRIBUTION FOR HEAVY DUTY DIESEL TRUCKS

Four VMT vs. age distributions are used in MOBILE3 tc estimate the VMT distribution for heavy duty diesel vehicles in any given calendar year. The four distributions are for four weight classes of diesel trucks: 2b, 3-5, 6, and 7-8. The distributions are shown in the first four columns of Table F-1.

The distributions are weighted together by the registration fractions for vehicles in each weight class to arrive at an overall heavy duty diesel mileage distribution for each calendar year. Table F-1 shows these registration fractions at the bottom of the column for calendar year 1982. The "weighted average" column shows the actual mileage distribution used for 1982. The estimated number of vehicles in each weight class for each calendar year are shown in Table F-2.

Table F-1

1982 Calendar Year VMT Example HDDV

| | ----------VMT Distributions---------- | | | | |
|---|---|---|---|---|---|
| Age | 2B | 3-5 (Light) | 6 (Medium) | 7-8 (Heavy) | Weighted* Average |
| 1 | 18,352 | 45,544 | 53,370 | 82,288 | 78,209 |
| 2 | 16,946 | 39,671 | 46,901 | 78,984 | 71,134 |
| 3 | 15,648 | 34,558 | 41,190 | 68,328 | 64,701 |
| 4 | 14,449 | 30,092 | 36,206 | 62,263 | 58,857 |
| 5 | 13,342 | 26,213 | 31,812 | 56,737 | 53,543 |
| 6 | 12,320 | 22,834 | 27,948 | 51,700 | 48,711 |
| 7 | 11,376 | 19,898 | 24,556 | 47,111 | 44,318 |
| 8 | 10,504 | 17,332 | 21,575 | 42,930 | 40,325 |
| 9 | 9,700 | 15,098 | 18,956 | 39,119 | 36,692 |
| 10 | 8,956 | 13,152 | 16,655 | 35,647 | 33,389 |
| 11 | 8,270 | 11,456 | 14,632 | 32,483 | 30,385 |
| 12 | 7,637 | 9,979 | 12,856 | 29,599 | 27,652 |
| 13 | 7,052 | 8,693 | 11,296 | 26,972 | 25,167 |
| 14 | 6,511 | 7,572 | 9,925 | 24,578 | 22,906 |
| 15 | 6,012 | 6,596 | 8,719 | 22,396 | 20,849 |
| 16 | 5,552 | 5,746 | 7,661 | 20,408 | 18,978 |
| 17 | 5,126 | 5,005 | 6,728 | 18,597 | 17,275 |
| 18 | 4,734 | 4,360 | 5,913 | 16,946 | 15,726 |
| 19 | 4,371 | 3,798 | 5,196 | 15,442 | 14,316 |
| 20 | 4,036 | 3,308 | 4,565 | 14,071 | 13,033 |
| % of Total HDDVs, 1982* | 2.7% | 0.5% | 7.5% | 89.3% | |

---

* The registration fractions for the four HDDV classes are calculated from the total registrations by class (Table F-2) divided by the overall HDDV registrations (last column of Table F-2).

## Table F-2

## Total HDDV Registrations by Class
## for 1980 through 2000

| Calendar | Total Registrations (in Millions) | | | | |
|---|---|---|---|---|---|
| Year | Class 2B | 3-5 (Light) | 6 (Medium) | 7-8 (Heavy) | Overall |
| 1980 | 0.000 | 0.006 | 0.112 | 1.521 | 1.639 |
| 1981 | 0.000 | 0.006 | 0.124 | 1.581 | 1.711 |
| 1982 | 0.049 | 0.009 | 0.135 | 1.599 | 1.792 |
| 1983 | 0.104 | 0.013 | 0.141 | 1.592 | 1.850 |
| 1984 | 0.185 | 0.022 | 0.153 | 1.641 | 2.001 |
| 1985 | 0.274 | 0.037 | 0.166 | 1.719 | 2.196 |
| 1986 | 0.370 | 0.089 | 0.193 | 1.816 | 2.416 |
| 1987 | 0.475 | 0.071 | 0.185 | 1.927 | 2.658 |
| 1988 | 0.588 | 0.089 | 0.193 | 2.041 | 2.911 |
| 1989 | 0.707 | 0.106 | 0.201 | 2.151 | 3.165 |
| 1990 | 0.831 | 0.122 | 0.208 | 2.258 | 3.419 |
| 1991 | 0.960 | 0.137 | 0.215 | 2.362 | 3.674 |
| 1992 | 1.092 | 0.151 | 0.222 | 2.471 | 3.936 |
| 1993 | 1.225 | 0.165 | 0.229 | 2.581 | 4.200 |
| 1994 | 1.354 | 0.178 | 0.237 | 2.693 | 4.462 |
| 1995 | 1.480 | 0.190 | 0.245 | 2.807 | 4.772 |
| 1996 | 1.600 | 0.202 | 0.253 | 2.914 | 4.969 |
| 1997 | 1.712 | 0.212 | 0.261 | 3.015 | 5.200 |
| 1998 | 1.816 | 0.222 | 0.269 | 3.108 | 5.415 |
| 1999 | 1.912 | 0.230 | 0.276 | 3.194 | 5.612 |
| 2000 | 1.999 | 0.238 | 0.283 | 3.273 | 5.793 |

## Appendix G -1

## SAMPLE CALCULATION OF MOTOR VEHICLE EMISSIONS

This appendix presents the procedure for calculating emission factors in a step-by-step manner. Although most users of motor vehicle emission factors should rely on computerized calculations (such as MOBILE3), this sample calculation may prove useful to those becoming familiar with the methodologies presented in this document.

For this sample calculation, the light duty gasoline powered vehicle (LDGV) hydrocarbon emissions for January 1, 1988 are computed. An ambient temperature of 80°F is assumed. Although this HC calculation is only for the LDGVs, it is designed to give the user an understanding of the logical sequence of calculations. The emission factor calculation procedure of the other vehicle types follows the same logical sequence; however, the equations may differ.

An inventory of motor vehicle sources of hydrocarbon emissions should include emissions from the eight vehicle types. For each vehicle type the exhaust emission factors should be calculated with the equation presented in the corresponding chapter. The resultant exhaust emission factors multiplied by the fraction of vehicles-miles-traveled (VMT) for the respective vehicle types will sum to the average gram/mile exhaust emission levels from the entire highway mobile source fleet. For hydrocarbon emission estimates, the crankcase and evaporative HC emissions are calculated and added to the exhaust HC emissions estimates.

### G.1 DATA REQUIREMENTS

Before determining what data are required, the user should review the conditions under which vehicles are tested in order to ascertain whether these conditions differ from the locality specific ambient temperature, average speeds, and vehicle operating modes (see Section .A.1 in each chapter).

The user should determine the following locality specific data:

1. Ambient temperature.

2. Fraction of January 1 travel, by model year, for each vehicle type (model year registration distributions and fleet annual mileage accumulation rates).

3. The VMT mix.

4. Percent of VMT in cold start and hot start operating modes for light duty vehicles, light duty trucks, and motorcycles.

5. The calendar year of study (January 1 of that year).
6. Any other data required to utilize additional (optional) correction factors.

## G.2 DATA USED TO CALCULATE HC EMISSIONS

For this sample calculation, the following conditions are assumed:

1. Ambient temperature is 80°F.
2. National statistics on average fleet annual mileage accumulation rates and vehicle registration by model year are used.
3. The total hydrocarbon emissions (as opposed to nonmethane HC) are calculated for the speed of 30 mph.
4. The percentages of VMT in the cold start, stabilized, and hot start operating modes are assumed to be 40%, 30%, and 30% respectively, for light duty vehicles; both catalyst and non-catalyst.
5. The calendar year of study is 1988.
6. All other conditions are assumed to match the vehicle testing conditions.

## G.3 CALCULATION OF EXHAUST EMISSION FACTORS

The equation to calculate the exhaust hydrocarbon emission factor for LDGVs is discussed in Chapter 1.

Since the air conditioning usage (ACCFipt), extra load (XLCFip), trailer towing (TWCFip), and humidity level for NOx (HCF) are assumed to match the basic test conditions, they are set equal to 1.0 (i.e., they have no effect on the calculations and may be disregarded).

### G.3.1 Basic Exhaust Emission Levels (BER)

The basic exhaust emission levels for LDGVs are the emission levels per mile; assuming the basic test conditions. The HC emission levels on January 1, 1988 are listed in Table G-1 and will be used to calculate the exhaust HC emissions.

### G.3.2 Operating-Mode/Temperature Correction Factor (OMTCF) and Speed Correction Factor (SALCHF)

Although the operating-mode/temperature correction factor can be calculated manually using the generalized equations in Chapter 1, MOBILE3 was used to generate the OMTCF values for a cold/stable/hot mix of 40%/30%/30%, and ambient temperature of 80°F. The appropriate OMTCF values are listed in Table G-1. Since the average speed in this example is 30 mph, speed factors are needed to correct emissions from 19.6 mph to 30 mph. These are shown in the column marked "SALHCF."

### G.3.3 Tampering Offset (OMTTAM)

The effects of tampering on each model year's emission rate are estimated with OMTTAM. The tampering offset has already been corrected for temperature and operating mode, and then is added to the basic emission rate (BER) after BER has been corrected for operating mode and temperature (with OMTCF). The OMTTAM values in Table G-1 have already been corrected for operating mode and temperatures.

### G.3.4 Travel Weighting Fractions (TF)

In order to calculate the fraction of annual travel by model year, the fraction of in-use vehicles by model year are weighted on the basis of annual rate of mileage accumulation. In many cases, locality specific data on automobile use and registration are readily available. Whenever possible, local data should be used. However, for purposes of this sample calculation, the national average fraction of annual travel (Appendix H) will be used. The TF values are also listed in Table G-1 and are used to weight the individual model year emission factors together to form a fleet number.

### G.3.5 Calculated Exhaust Emission Factors

The final step in the calculation of the exhaust HC emission factor for LDGVs is to multiply the mean emission level by the operating mode/temperature correction factor, add the tampering offset, and then multiply by the speed correction factor and travel fraction. This procedure is shown in Table G-1. The emission factor is expressed in units of grams per vehicle mile traveled.

If the pollutant were CO or NOx, no further calculations would be needed to estimate the total exhaust emission factor. However, for HC emission estimates the additional calculations in Sections G.3.6 and G.3.7 need to be performed.

### G.3.6 Crankcase and Evaporative HC Emission Levels (CCEVERT)

To calculate the crankcase and evaporative HC emission level, the model year hot soak (HS), diurnal (DI), and crankcase emissions (CC), plus the tampering offsets (TAMEVP 1,2,3) are required. Further, the fractions of annual travel by model year (TFin) are required (the same as in Section G.3.2).

The procedure for estimating evaporative and crankcase emissions is shown in Table G-2. The algorithm for estimating emissions for each model year is shown at the bottom of the table. The fleet emission factor is expressed in units of grams per vehicle mile traveled.

### G.3.7 Total HC Emission Factors

Summing the emission factors from Sections G.3.5 and G.3.6 gives the total HC emission factor. For this example the total HC emission factor is 2.36 grams/mile (1.513 + 0.848).

Table G-1

## CALCULATION OF EXHAUST HYDROCARBON EMISSION FACTOR FOR LIGHT DUTY GASOLINE POWERED VEHICLES

Ambient Temperature 80°F, Avg. Route Speed 30 mph,
40% Cold Start/30% Hot Start,
January 1, 1988

| Model Year(i) | BER | OMTCF | OMTTAM | SALHCF | TF | (BER*OMTCF+OMTTAM) *SALHCF*TF |
|---|---|---|---|---|---|---|
| 1988 | 0.219 | 1.508 | 0.027 | 0.726 | 0.036 | 0.009 |
| 1987 | 0.315 | 1.429 | 0.042 | 0.726 | 0.137 | 0.049 |
| 1986 | 0.462 | 1.373 | 0.104 | 0.726 | 0.122 | 0.066 |
| 1985 | 0.602 | 1.346 | 0.165 | 0.726 | 0.109 | 0.077 |
| 1984 | 0.777 | 1.340 | 0.231 | 0.726 | 0.097 | 0.090 |
| 1983 | 0.867 | 1.341 | 0.314 | 0.726 | 0.085 | 0.092 |
| 1982 | 0.994 | 1.339 | 0.379 | 0.726 | 0.075 | 0.093 |
| 1981 | 1.135 | 1.344 | 0.449 | 0.726 | 0.064 | 0.091 |
| 1980 | 1.184 | 1.350 | 0.718 | 0.667 | 0.056 | 0.087 |
| 1979 | 3.518 | 1.150 | 0.726 | 0.680 | 0.048 | 0.156 |
| 1978 | 3.727 | 1.148 | 0.789 | 0.680 | 0.041 | 0.141 |
| 1977 | 3.925 | 1.147 | 0.815 | 0.717 | 0.034 | 0.129 |
| 1976 | 4.112 | 1.145 | 0.892 | 0.717 | 0.027 | 0.110 |
| 1975 | 4.288 | 1.144 | 0.918 | 0.717 | 0.021 | 0.089 |
| 1974 | 5.491 | 1.066 | 0.132 | 0.706 | 0.016 | 0.068 |
| 1973 | 5.590 | 1.065 | 0.139 | 0.706 | 0.011 | 0.048 |
| 1972 | 5.683 | 1.064 | 0.048 | 0.795 | 0.007 | 0.033 |
| 1971 | 8.249 | 1.063 | 0.025 | 0.798 | 0.005 | 0.033 |
| 1960 | 8.430 | 1.063 | 0.026 | 0.811 | 0.003 | 0.024 |
| 1969 | 8.215 | 1.058 | 0.0 | 0.781 | 0.004 | 0.028 |

Exhaust HC = 1.513 g/mi

Table G-2

## CALCULATION OF CRANKCASE AND EVAPORATIVE HYDROCARBON EMISSION FACTOR FOR LIGHT DUTY GASOLINE POWERED VEHICLES

Calendar Year 1988

| Model Year | HS | TAM1 | DI | TAM2 | CC | TAM3 | TF | CCEVERT*TF |
|---|---|---|---|---|---|---|---|---|
| 1988 | 2.050 | 0.0 | 9.310 | 0.0 | 0.0 | 0.001 | 0.036 | 0.018 |
| 1987 | 2.050 | 0.0 | 9.310 | 0.0 | 0.0 | 0.006 | 0.137 | 0.069 |
| 1986 | 2.500 | 0.013 | 9.310 | 0.027 | 0.0 | 0.014 | 0.122 | 0.068 |
| 1985 | 2.500 | 0.033 | 9.310 | 0.069 | 0.0 | 0.021 | 0.109 | 0.062 |
| 1984 | 3.010 | 0.080 | 9.310 | 0.109 | 0.0 | 0.028 | 0.097 | 0.061 |
| 1983 | 3.310 | 0.130 | 9.310 | 0.146 | 0.0 | 0.034 | 0.085 | 0.058 |
| 1982 | 3.540 | 0.182 | 9.310 | 0.181 | 0.0 | 0.043 | 0.075 | 0.053 |
| 1981 | 3.750 | 0.239 | 9.310 | 0.215 | 0.0 | 0.050 | 0.064 | 0.048 |
| 1980 | 3.980 | 0.248 | 9.310 | 0.366 | 0.0 | 0.058 | 0.056 | 0.044 |
| 1979 | 3.980 | 0.277 | 9.310 | 0.410 | 0.0 | 0.075 | 0.048 | 0.039 |
| 1978 | 3.980 | 0.306 | 9.310 | 0.452 | 0.0 | 0.081 | 0.041 | 0.033 |
| 1977 | 12.320 | 0.575 | 23.530 | 0.365 | 0.0 | 0.091 | 0.034 | 0.072 |
| 1976 | 12.320 | 0.618 | 23.530 | 0.393 | 0.0 | 0.097 | 0.027 | 0.058 |
| 1975 | 12.320 | 0.659 | 23.530 | 0.419 | 0.0 | 0.102 | 0.021 | 0.046 |
| 1974 | 12.320 | 0.698 | 23.530 | 0.443 | 0.0 | 0.110 | 0.016 | 0.035 |
| 1973 | 12.320 | 0.735 | 23.530 | 0.467 | 0.0 | 0.115 | 0.011 | 0.024 |
| 1972 | 12.320 | 0.769 | 23.530 | 0.489 | 0.0 | 0.120 | 0.007 | 0.015 |
| 1971 | 16.150 | 0.273 | 38.580 | 0.712 | 0.0 | 0.124 | 0.005 | 0.014 |
| 1960 | 22.450 | 0.0 | 47.990 | 0.0 | 0.0 | 0.137 | 0.003 | 0.013 |
| 1969 | 22.450 | 0.0 | 47.990 | 0.0 | 0.0 | 0.0 | 0.004 | 0.016 |

Evaporative HC = 0.848

---

CCEVERT=(((HS+TAM1)*TPD+(DI+TAM2))/MPD)+(CC+TAM3)
TPD=3.05 and MPD=31.1 for LDGVs

## Appendix H -1

## HIGHWAY MOBILE SOURCE EMISSION FACTOR TABLES

All of the emission factor tables for each region and vehicle type are given within this appendix. Each emission factor table has a three digit identification table number. The table numbers have the following format:

R.VT.#

where

R indicates the region code
1 = Low altitude non-California
2 = High altitude non-California

VT indicates the vehicle type
1 = LDGV
2 = LDGT1
3 = LDGT2
4 = HDGV
5 = LDDV
6 = LDDT
7 = HDDV
8 = MC

# indicates which of the 16 types of table are referenced.

In addition to this coding scheme for the table numbers, the table titles include the information so that no confusion can arise. Table H-1 gives a summary of every table and table number for each region. There is a total of 100 tables for each of the two regions presented in this appendix.

Table H-1

## SUMMARY OF THE EMISSION FACTOR TABLE NUMBERS FOR EACH REGION BY VEHICLE TYPE AND TABLE TYPE

| | Vehicle Type Code "VT" | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Table Code "#" Description | .1 LDGV | .2 LDGT1 | .3 LDGT2 | .4 HDGV | .5 LDDV | .6 LDDT | .7 HDDV | .8 MC |
| Untampered Basic Exhaust Emissions | R.1.1A | R.2.1A | R.3.1A | R.4.1A | R.5.1 | R.6.1 | R.7.1 | R.8.1A |
| Actual Exhaust Emissions at Various Mileage Intervals | R.1.1B | R.2.1B | R.3.1B | R.4.1B | --- | --- | --- | --- |
| Untampered Crankcase & Evap. HC Emissions | R.1.1C | R.2.1C | R.3.1C | R.4.1C | -- | -- | -- | R.8.1C |
| Total Crankcase & Evap HC at Various Mileage Intervals | R.1.1D | R.2.1D | R.3.1D | R.4.1D | --- | --- | --- | --- |
| Basic HC Emission Levels | R.1.2A | R.2.2A | R.3.2A | R.4.2A | R.5.2A | R.6.2A | R.7.2A | R.8.2A |
| Basic CO Emission Levels | R.1.2B | R.2.2B | R.3.2B | R.4.2B | R.5.2B | R.6.2B | R.7.2B | R.8.2B |
| Basic NOx Emission Levels | R.1.2C | R.2.2C | R.3.2C | R.4.2C | R.5.2C | R.6.2C | R.7.2C | R.8.2C |
| Idle Emissions | R.1.3 | R.2.3 | R.3.3 | R.4.3 | R.5.3 | R.6.3 | R.7.3 | R.8.3 |
| Registration & Mileage Information | R.1.4 | R.2.4 | R.3.4 | R.4.4 | R.5.4 | R.6.4 | R.7.4 | R.8.4 |
| Example Travel Weighting Fractions | R.1.5 | R.2.5 | R.3.5 | R.4.5 | R.5.5 | R.6.5 | R.7.5 | R.8.5 |
| Speed Correction Factor Coefficients | R.1.6 | R.2.6 | R.3.6 | R.4.6 | R.5.6 | R.6.6 | R.7.6 | R.8.6 |
| Temperature Correction Factor Coefficients | R.1.7A | R.2.7A | R.3.7A | R.4.7 | | | | R.8.7A |
| Normalized Bag Fractions | R.1.7B | R.2.7B | R.3.7B | -- | R.5.7B | R.6.7B | -- | R.8.7B |
| Air Conditioning Correction Factor Coefficients | R.1.8A | R.2.8A | R.3.8A | -- | -- | -- | -- | -- |
| Air Conditioning Fleet Sizes | R.1.8B | R.2.8B | R.3.8B | -- | -- | -- | -- | -- |
| Extra Load Correction Factors | R.1.9 | R.2.9 | R.3.9 | -- | -- | -- | -- | -- |
| Trailer Towing Correction Factors | R.1.10 | R.2.10 | R.3.10 | -- | -- | -- | -- | -- |

Region Code "R": 1 = Low altitude non-California
2 = High altitude non-California

## TABLE 1.1.1A

## EXHAUST EMISSION RATES FOR
## LOW ALTITUDE
## LIGHT DUTY GASOLINE POWERED VEHICLES
## (RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Mile) | Deterioration Rate (Gm/Mi/10K Mi) | 50,000 Mile Emission Level (Grams/Mile) |
|---|---|---|---|---|
| HC | Pre-1968 | 7.25 | 0.18 | 8.15 |
| | 1968-1969 | 4.43 | 0.25 | 5.68 |
| | 1970-1971 | 3.00 | 0.37 | 4.85 |
| | 1972-1974 | 3.36 | 0.17 | 4.21 |
| | 1975-1979 | 1.07 | 0.27 | 2.42 |
| | 1980 | 0.36 | 0.10 | 0.86 |
| | 1981 | 0.25 | 0.12 | 0.85 |
| | 1982 | 0.22 | 0.12 | 0.82 |
| | 1983 | 0.21 | 0.12 | 0.81 |
| | 1984 | 0.20 | 0.13 | 0.85 |
| | 1985-1989 | 0.20 | 0.12 | 0.80 |
| | 1990+ | 0.20 | 0.11 | 0.75 |
| CO | Pre-1968 | 78.27 | 2.25 | 89.52 |
| | 1968-1969 | 56.34 | 2.55 | 69.09 |
| | 1970-1971 | 42.17 | 3.13 | 57.82 |
| | 1972-1974 | 40.78 | 2.44 | 52.98 |
| | 1975-1979 | 18.23 | 2.59 | 31.18 |
| | 1980 | 6.09 | 0.73 | 9.74 |
| | 1981 | 2.13 | 1.90 | 11.63 |
| | 1982 | 1.09 | 1.91 | 10.64 |
| | 1983 | 1.09 | 1.90 | 10.59 |
| | 1984 | 0.99 | 2.07 | 11.34 |
| | 1985-1986 | 1.04 | 1.96 | 10.84 |
| | 1987-1989 | 1.11 | 1.87 | 10.46 |
| | 1990+ | 1.14 | 1.82 | 10.24 |
| NOx | Pre-1968 | 3.44 | 0.0 | 3.44 |
| | 1968-1972 | 4.35 | 0.0 | 4.35 |
| | 1973-1974 | 2.87 | 0.04 | 3.07 |
| | 1975-1976 | 2.44 | 0.03 | 2.59 |
| | 1977-1979 | 1.70 | 0.09 | 2.15 |
| | 1980 | 1.50 | 0.07 | 1.85 |
| | 1981 | 0.59 | 0.08 | 0.99 |
| | 1982 | 0.63 | 0.08 | 1.03 |
| | 1983 | 0.56 | 0.08 | 0.96 |
| | 1984 | 0.53 | 0.09 | 0.98 |
| | 1985-1986 | 0.53 | 0.09 | 0.98 |
| | 1987-1989 | 0.53 | 0.10 | 1.03 |
| | 1990+ | 0.53 | 0.10 | 1.03 |

* WHERE : BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

DATE : MAY 25, 1985

TABLE 1.1.1B

### EXHAUST EMISSION RATES FOR
### LOW ALTITUDE
### LIGHT DUTY GASOLINE POWERED VEHICLES
### AT VARIOUS MILEAGE INTERVALS
### (RATES INCLUDE TAMPERING)

| Pol | Model Years | Emission Rate (Grams/Mile)<br>0K | 20K | 40K | 60K | 80K | 100K | 120K | 140K |
|---|---|---|---|---|---|---|---|---|---|
| HC | Pre-1968 | 7.25 | 7.61 | 7.97 | 8.33 | 8.69 | 9.05 | 9.40 | 9.76 |
| | 1968-1969 | 4.43 | 4.94 | 5.44 | 5.95 | 6.46 | 6.97 | 7.47 | 7.98 |
| | 1970-1971 | 3.00 | 3.74 | 4.48 | 5.22 | 5.96 | 6.70 | 7.44 | 8.18 |
| | 1972 | 3.36 | 3.70 | 4.05 | 4.39 | 4.74 | 5.09 | 5.43 | 5.78 |
| | 1973-1974 | 3.36 | 3.71 | 4.07 | 4.43 | 4.79 | 5.15 | 5.51 | 5.87 |
| | 1975 | 1.10 | 1.74 | 2.43 | 3.13 | 3.82 | 4.52 | 5.21 | 5.91 |
| | 1976 | 1.10 | 1.75 | 2.44 | 3.14 | 3.84 | 4.54 | 5.24 | 5.94 |
| | 1977 | 1.10 | 1.74 | 2.44 | 3.13 | 3.83 | 4.53 | 5.22 | 5.92 |
| | 1978-1979 | 1.11 | 1.75 | 2.45 | 3.15 | 3.86 | 4.56 | 5.26 | 5.96 |
| | 1980 | 0.40 | 0.71 | 1.09 | 1.47 | 1.84 | 2.22 | 2.60 | 2.98 |
| | 1981 | 0.28 | 0.60 | 0.96 | 1.32 | 1.68 | 2.04 | 2.40 | 2.76 |
| | 1982 | 0.25 | 0.56 | 0.92 | 1.28 | 1.64 | 2.00 | 2.36 | 2.72 |
| | 1983 | 0.24 | 0.55 | 0.91 | 1.27 | 1.62 | 1.98 | 2.34 | 2.69 |
| | 1984 | 0.23 | 0.56 | 0.92 | 1.29 | 1.65 | 2.02 | 2.38 | 2.75 |
| | 1985-1986 | 0.23 | 0.53 | 0.88 | 1.22 | 1.56 | 1.90 | 2.25 | 2.59 |
| | 1987-1989 | 0.23 | 0.53 | 0.87 | 1.22 | 1.56 | 1.90 | 2.24 | 2.58 |
| | 1990+ | 0.23 | 0.51 | 0.83 | 1.16 | 1.48 | 1.80 | 2.12 | 2.44 |
| CO | Pre-1968 | 78.26 | 82.72 | 87.17 | 91.63 | 96.09 | 100.55 | 105.01 | 109.47 |
| | 1968-1969 | 56.34 | 61.42 | 66.55 | 71.68 | 76.80 | 81.93 | 87.06 | 92.19 |
| | 1970-1971 | 42.17 | 48.47 | 54.81 | 61.15 | 67.49 | 73.83 | 80.17 | 86.51 |
| | 1972 | 40.78 | 45.76 | 50.82 | 55.88 | 60.94 | 65.99 | 71.05 | 76.11 |
| | 1973-1974 | 40.78 | 45.92 | 51.30 | 56.69 | 62.07 | 67.45 | 72.84 | 78.22 |
| | 1975 | 18.51 | 24.70 | 31.57 | 38.44 | 45.31 | 52.18 | 59.05 | 65.92 |
| | 1976 | 18.53 | 24.72 | 31.58 | 38.45 | 45.31 | 52.17 | 59.03 | 65.90 |
| | 1977 | 18.53 | 24.67 | 31.45 | 38.22 | 44.99 | 51.76 | 58.54 | 65.31 |
| | 1978-1979 | 18.54 | 24.72 | 31.53 | 38.34 | 45.15 | 51.96 | 58.77 | 65.58 |
| | 1980 | 6.42 | 9.03 | 12.41 | 15.79 | 19.17 | 22.54 | 25.92 | 29.30 |
| | 1981 | 2.34 | 6.96 | 12.18 | 17.39 | 22.60 | 27.81 | 33.02 | 38.24 |
| | 1982 | 1.30 | 5.90 | 11.05 | 16.20 | 21.35 | 26.51 | 31.66 | 36.81 |
| | 1983 | 1.30 | 5.85 | 10.93 | 16.00 | 21.08 | 26.16 | 31.23 | 36.31 |
| | 1984 | 1.18 | 6.00 | 11.31 | 16.62 | 21.93 | 27.23 | 32.54 | 37.85 |
| | 1985-1986 | 1.23 | 5.78 | 10.78 | 15.77 | 20.76 | 25.75 | 30.74 | 35.73 |
| | 1987-1989 | 1.30 | 5.65 | 10.42 | 15.18 | 19.95 | 24.71 | 29.48 | 34.24 |
| | 1990+ | 1.33 | 5.58 | 10.24 | 14.91 | 19.57 | 24.23 | 28.90 | 33.56 |
| NOx | Pre-1968 | 3.44 | 3.44 | 3.44 | 3.44 | 3.44 | 3.44 | 3.44 | 3.44 |
| | 1968-1972 | 4.35 | 4.35 | 4.35 | 4.34 | 4.34 | 4.34 | 4.34 | 4.34 |
| | 1973 | 2.87 | 2.99 | 3.11 | 3.24 | 3.36 | 3.48 | 3.60 | 3.73 |
| | 1974 | 2.87 | 3.00 | 3.13 | 3.25 | 3.38 | 3.51 | 3.64 | 3.76 |
| | 1975-1976 | 2.44 | 2.63 | 2.82 | 3.01 | 3.20 | 3.39 | 3.58 | 3.77 |
| | 1977-1979 | 1.70 | 2.02 | 2.34 | 2.66 | 2.97 | 3.29 | 3.61 | 3.93 |
| | 1980 | 1.50 | 1.79 | 2.07 | 2.36 | 2.65 | 2.94 | 3.23 | 3.52 |
| | 1981 | 0.60 | 0.85 | 1.13 | 1.41 | 1.69 | 1.97 | 2.25 | 2.53 |
| | 1982 | 0.64 | 0.89 | 1.17 | 1.45 | 1.73 | 2.01 | 2.29 | 2.57 |
| | 1983 | 0.57 | 0.82 | 1.10 | 1.38 | 1.66 | 1.94 | 2.22 | 2.50 |
| | 1984 | 0.54 | 0.82 | 1.14 | 1.46 | 1.78 | 2.10 | 2.42 | 2.74 |
| | 1985-1986 | 0.54 | 0.82 | 1.14 | 1.46 | 1.78 | 2.10 | 2.42 | 2.74 |
| | 1987-1989 | 0.54 | 0.84 | 1.18 | 1.52 | 1.86 | 2.20 | 2.53 | 2.87 |
| | 1990+ | 0.54 | 0.84 | 1.18 | 1.52 | 1.86 | 2.20 | 2.53 | 2.87 |

DATE : MAY 25, 1985

## TABLE 1.1.1C

## CRANKCASE AND EVAPORATIVE HYDROCARBON EMISSIONS
## FOR LOW ALTITUDE
## LIGHT DUTY GASOLINE POWERED VEHICLES
## (RATES REFLECT ZERO TAMPERING)

** CCEV = (HSK * TPD + DNL)/MPD + CC

| Model Years | SHED Hot Soak Emissions (Gm/Trip) | Trips* Per Day | SHED Diurnal Emissions (Gm/Day) | Miles* Per Day | Crankcase Emissions (Gm/Mile) | Total Crankcase and Evap. Emissions (Gm/Mile) |
|---|---|---|---|---|---|---|
| Pre-1963 | 22.45 | 3.05 | 47.99 | 31.10 | 4.10 | 7.84 |
| 1963-1967 | 22.45 | 3.05 | 47.99 | 31.10 | 0.80 | 4.54 |
| 1968-1970 | 22.45 | 3.05 | 47.99 | 31.10 | 0.0 | 3.74 |
| 1971 | 16.15 | 3.05 | 38.58 | 31.10 | 0.0 | 2.82 |
| 1972-1977 | 12.32 | 3.05 | 23.53 | 31.10 | 0.0 | 1.96 |
| 1978-1980 | 3.98 | 3.05 | 9.31 | 31.10 | 0.0 | 0.69 |
| 1981 | 3.75 | 3.05 | 9.31 | 31.10 | 0.0 | 0.67 |
| 1982 | 3.54 | 3.05 | 9.31 | 31.10 | 0.0 | 0.65 |
| 1983 | 3.31 | 3.05 | 9.31 | 31.10 | 0.0 | 0.62 |
| 1984 | 3.01 | 3.05 | 9.31 | 31.10 | 0.0 | 0.59 |
| 1985-1986 | 2.50 | 3.05 | 9.31 | 31.10 | 0.0 | 0.54 |
| 1987-1989 | 2.05 | 3.05 | 9.31 | 31.10 | 0.0 | 0.50 |
| 1990+ | 1.82 | 3.05 | 9.31 | 31.10 | 0.0 | 0.48 |

* Default information that may be altered by the MOBILE3 user with information about the local area.

** WHERE :

CCEV = Total untampered crankcase & evaporative HC emissions (Gm/Mile)
HSK = Hot soak emissions (Gm/Trip)
TPD = Trips per day
DNL = Diurnal emissions (Gm/Day)
MPD = Miles per day
CC = Crankcase emissions (Gm/Mile)

DATE : MAY 25, 1985

## TABLE 1.1.1D

## TOTAL CRANKCASE AND EVAPORATIVE HC EMISSIONS
## FOR LOW ALTITUDE
## LIGHT DUTY GASOLINE POWERED VEHICLES
## AT VARIOUS MILEAGE INTERVALS
## (RATES INCLUDE TAMPERING)

| Model Years | Emission Rate (Grams/Mile) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 0K | 20K | 40K | 60K | 80K | 100K | 120K | 140K |
| Pre-1963 | 7.84 | 7.84 | 7.84 | 7.84 | 7.84 | 7.84 | 7.84 | 7.84 |
| 1963-1967 | 4.54 | 4.54 | 4.54 | 4.54 | 4.54 | 4.54 | 4.54 | 4.54 |
| 1968-1970 | 3.75 | 3.76 | 3.78 | 3.80 | 3.82 | 3.84 | 3.86 | 3.88 |
| 1971 | 2.83 | 2.84 | 2.87 | 2.90 | 2.92 | 2.95 | 2.97 | 3.00 |
| 1972-1974 | 1.97 | 1.99 | 2.02 | 2.05 | 2.08 | 2.12 | 2.15 | 2.18 |
| 1975-1977 | 1.97 | 1.99 | 2.02 | 2.05 | 2.08 | 2.11 | 2.15 | 2.18 |
| 1978-1979 | 0.69 | 0.71 | 0.74 | 0.76 | 0.79 | 0.82 | 0.84 | 0.87 |
| 1980 | 0.69 | 0.71 | 0.73 | 0.76 | 0.78 | 0.81 | 0.83 | 0.86 |
| 1981 | 0.67 | 0.68 | 0.71 | 0.73 | 0.75 | 0.78 | 0.80 | 0.82 |
| 1982 | 0.65 | 0.66 | 0.69 | 0.71 | 0.73 | 0.75 | 0.78 | 0.80 |
| 1983 | 0.62 | 0.64 | 0.66 | 0.68 | 0.70 | 0.72 | 0.74 | 0.77 |
| 1984 | 0.60 | 0.61 | 0.63 | 0.65 | 0.67 | 0.69 | 0.71 | 0.73 |
| 1985-1986 | 0.55 | 0.56 | 0.58 | 0.60 | 0.61 | 0.63 | 0.65 | 0.67 |
| 1987-1989 | 0.50 | 0.51 | 0.53 | 0.55 | 0.56 | 0.58 | 0.60 | 0.61 |
| 1990+ | 0.48 | 0.49 | 0.51 | 0.52 | 0.54 | 0.55 | 0.57 | 0.59 |

DATE : MAY 25, 1985

## TABLE 1.1.2A

DATE : MAY 25, 1985

### EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
### LIGHT DUTY GASOLINE POWERED VEHICLES
### TOTAL HC (INCLUDES EVAP & CRANKCASE)

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 17.9 | 1962 | 17.9 | 1963 | 14.6 | 1964 | 14.6 | 1965 | 14.6 | 1966 | 14.6 | 1967 | 14.6 | 1968 | 12.1 | 1969 | 12.1 | 1970 | 12.6 | 1971 | 11.6 | 1972 | 8.1 |
| 1962 | 17.8 | 1963 | 14.5 | 1964 | 14.5 | 1965 | 14.5 | 1966 | 14.5 | 1967 | 14.5 | 1968 | 12.0 | 1969 | 12.0 | 1970 | 12.4 | 1971 | 11.5 | 1972 | 8.1 | 1973 | 8.1 |
| 1963 | 14.4 | 1964 | 14.4 | 1965 | 14.4 | 1966 | 14.4 | 1967 | 14.4 | 1968 | 11.9 | 1969 | 11.9 | 1970 | 12.2 | 1971 | 11.3 | 1972 | 8.0 | 1973 | 8.0 | 1974 | 8.0 |
| 1964 | 14.3 | 1965 | 14.3 | 1966 | 14.3 | 1967 | 14.3 | 1968 | 11.8 | 1969 | 11.8 | 1970 | 12.0 | 1971 | 11.1 | 1972 | 7.9 | 1973 | 7.9 | 1974 | 7.9 | 1975 | 6.9 |
| 1965 | 14.2 | 1966 | 14.2 | 1967 | 14.2 | 1968 | 11.6 | 1969 | 11.6 | 1970 | 11.8 | 1971 | 10.9 | 1972 | 7.8 | 1973 | 7.8 | 1974 | 7.8 | 1975 | 6.8 | 1976 | 6.8 |
| 1966 | 14.1 | 1967 | 14.1 | 1968 | 11.5 | 1969 | 11.5 | 1970 | 11.6 | 1971 | 10.7 | 1972 | 7.7 | 1973 | 7.7 | 1974 | 7.7 | 1975 | 6.6 | 1976 | 6.6 | 1977 | 6.6 |
| 1967 | 14.0 | 1968 | 11.3 | 1969 | 11.3 | 1970 | 11.4 | 1971 | 10.4 | 1972 | 7.6 | 1973 | 7.6 | 1974 | 7.6 | 1975 | 6.5 | 1976 | 6.5 | 1977 | 6.5 | 1978 | 5.2 |
| 1968 | 11.2 | 1969 | 11.2 | 1970 | 11.1 | 1971 | 10.2 | 1972 | 7.5 | 1973 | 7.5 | 1974 | 7.5 | 1975 | 6.3 | 1976 | 6.3 | 1977 | 6.3 | 1978 | 5.0 | 1979 | 5.0 |
| 1969 | 11.0 | 1970 | 10.9 | 1971 | 9.9 | 1972 | 7.4 | 1973 | 7.4 | 1974 | 7.4 | 1975 | 6.1 | 1976 | 6.1 | 1977 | 6.1 | 1978 | 4.8 | 1979 | 4.8 | 1980 | 2.3 |
| 1970 | 10.6 | 1971 | 9.7 | 1972 | 7.2 | 1973 | 7.2 | 1974 | 7.2 | 1975 | 5.9 | 1976 | 5.9 | 1977 | 5.9 | 1978 | 4.6 | 1979 | 4.6 | 1980 | 2.2 | 1981 | 2.3 |
| 1971 | 9.4 | 1972 | 7.1 | 1973 | 7.1 | 1974 | 7.1 | 1975 | 5.7 | 1976 | 5.7 | 1977 | 5.7 | 1978 | 4.4 | 1979 | 4.4 | 1980 | 2.2 | 1981 | 2.2 | 1982 | 2.1 |
| 1972 | 7.0 | 1973 | 7.0 | 1974 | 7.0 | 1975 | 5.5 | 1976 | 5.5 | 1977 | 5.5 | 1978 | 4.2 | 1979 | 4.2 | 1980 | 2.1 | 1981 | 2.1 | 1982 | 2.0 | 1983 | 2.0 |
| 1973 | 6.8 | 1974 | 6.8 | 1975 | 5.2 | 1976 | 5.2 | 1977 | 5.2 | 1978 | 4.0 | 1979 | 4.0 | 1980 | 2.0 | 1981 | 2.0 | 1982 | 1.9 | 1983 | 1.9 | 1984 | 1.9 |
| 1974 | 6.6 | 1975 | 5.0 | 1976 | 5.0 | 1977 | 5.0 | 1978 | 3.7 | 1979 | 3.7 | 1980 | 1.9 | 1981 | 1.9 | 1982 | 1.8 | 1983 | 1.8 | 1984 | 1.8 | 1985 | 1.6 |
| 1975 | 4.7 | 1976 | 4.7 | 1977 | 4.7 | 1978 | 3.4 | 1979 | 3.4 | 1980 | 1.8 | 1981 | 1.8 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.6 | 1985 | 1.5 | 1986 | 1.5 |
| 1976 | 4.4 | 1977 | 4.4 | 1978 | 3.2 | 1979 | 3.2 | 1980 | 1.7 | 1981 | 1.6 | 1982 | 1.6 | 1983 | 1.5 | 1984 | 1.5 | 1985 | 1.4 | 1986 | 1.4 | 1987 | 1.4 |
| 1977 | 4.1 | 1978 | 2.9 | 1979 | 2.9 | 1980 | 1.6 | 1981 | 1.5 | 1982 | 1.4 | 1983 | 1.4 | 1984 | 1.4 | 1985 | 1.3 | 1986 | 1.3 | 1987 | 1.2 | 1988 | 1.2 |
| 1978 | 2.6 | 1979 | 2.6 | 1980 | 1.5 | 1981 | 1.4 | 1982 | 1.3 | 1983 | 1.3 | 1984 | 1.2 | 1985 | 1.1 | 1986 | 1.1 | 1987 | 1.1 | 1988 | 1.1 | 1989 | 1.1 |
| 1979 | 2.2 | 1980 | 1.3 | 1981 | 1.2 | 1982 | 1.2 | 1983 | 1.1 | 1984 | 1.0 | 1985 | 1.0 | 1986 | 1.0 | 1987 | 0.9 | 1988 | 0.9 | 1989 | 0.9 | 1990 | 0.9 |
| 1980 | 1.3 | 1981 | 1.1 | 1982 | 1.1 | 1983 | 1.0 | 1984 | 0.9 | 1985 | 0.9 | 1986 | 0.9 | 1987 | 0.8 | 1988 | 0.8 | 1989 | 0.8 | 1990 | 0.8 | 1991 | 0.8 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 8.1 | 1974 | 8.1 | 1975 | 7.3 | 1976 | 7.3 | 1977 | 7.3 | 1978 | 6.1 | 1979 | 6.1 | 1980 | 2.8 | 1981 | 2.9 | 1982 | 2.9 | 1983 | 2.8 | 1984 | 2.9 |
| 1974 | 8.1 | 1975 | 7.2 | 1976 | 7.2 | 1977 | 7.2 | 1978 | 5.9 | 1979 | 5.9 | 1980 | 2.7 | 1981 | 2.9 | 1982 | 2.8 | 1983 | 2.8 | 1984 | 2.8 | 1985 | 2.6 |
| 1975 | 7.1 | 1976 | 7.1 | 1977 | 7.1 | 1978 | 5.8 | 1979 | 5.8 | 1980 | 2.7 | 1981 | 2.8 | 1982 | 2.7 | 1983 | 2.7 | 1984 | 2.8 | 1985 | 2.6 | 1986 | 2.6 |
| 1976 | 6.9 | 1977 | 6.9 | 1978 | 5.7 | 1979 | 5.7 | 1980 | 2.6 | 1981 | 2.7 | 1982 | 2.7 | 1983 | 2.6 | 1984 | 2.7 | 1985 | 2.5 | 1986 | 2.5 | 1987 | 2.5 |
| 1977 | 6.8 | 1978 | 5.5 | 1979 | 5.5 | 1980 | 2.6 | 1981 | 2.7 | 1982 | 2.6 | 1983 | 2.6 | 1984 | 2.6 | 1985 | 2.4 | 1986 | 2.4 | 1987 | 2.4 | 1988 | 2.4 |
| 1978 | 5.4 | 1979 | 5.4 | 1980 | 2.5 | 1981 | 2.6 | 1982 | 2.5 | 1983 | 2.5 | 1984 | 2.6 | 1985 | 2.4 | 1986 | 2.4 | 1987 | 2.3 | 1988 | 2.3 | 1989 | 2.3 |
| 1979 | 5.2 | 1980 | 2.4 | 1981 | 2.5 | 1982 | 2.5 | 1983 | 2.4 | 1984 | 2.5 | 1985 | 2.3 | 1986 | 2.3 | 1987 | 2.3 | 1988 | 2.3 | 1989 | 2.3 | 1990 | 2.1 |
| 1980 | 2.4 | 1981 | 2.5 | 1982 | 2.4 | 1983 | 2.4 | 1984 | 2.4 | 1985 | 2.2 | 1986 | 2.2 | 1987 | 2.2 | 1988 | 2.2 | 1989 | 2.2 | 1990 | 2.0 | 1991 | 2.0 |
| 1981 | 2.4 | 1982 | 2.3 | 1983 | 2.3 | 1984 | 2.3 | 1985 | 2.1 | 1986 | 2.1 | 1987 | 2.1 | 1968 | 2.1 | 1989 | 2.1 | 1990 | 1.9 | 1991 | 1.9 | 1992 | 1.9 |
| 1982 | 2.2 | 1983 | 2.2 | 1984 | 2.2 | 1985 | 2.0 | 1986 | 2.0 | 1987 | 2.0 | 1988 | 2.0 | 1989 | 2.0 | 1990 | 1.9 | 1991 | 1.9 | 1992 | 1.9 | 1993 | 1.9 |
| 1983 | 2.1 | 1984 | 2.1 | 1985 | 2.0 | 1986 | 2.0 | 1987 | 1.9 | 1988 | 1.9 | 1989 | 1.9 | 1990 | 1.8 | 1991 | 1.8 | 1992 | 1.8 | 1993 | 1.8 | 1994 | 1.8 |
| 1984 | 2.0 | 1985 | 1.9 | 1986 | 1.9 | 1987 | 1.8 | 1988 | 1.8 | 1989 | 1.8 | 1990 | 1.7 | 1991 | 1.7 | 1992 | 1.7 | 1993 | 1.7 | 1994 | 1.7 | 1995 | 1.7 |
| 1985 | 1.7 | 1986 | 1.7 | 1987 | 1.7 | 1988 | 1.7 | 1989 | 1.7 | 1990 | 1.6 | 1991 | 1.6 | 1992 | 1.6 | 1993 | 1.6 | 1994 | 1.6 | 1995 | 1.6 | 1996 | 1.6 |
| 1986 | 1.6 | 1987 | 1.6 | 1988 | 1.6 | 1989 | 1.6 | 1990 | 1.5 | 1991 | 1.5 | 1992 | 1.5 | 1993 | 1.5 | 1994 | 1.5 | 1995 | 1.5 | 1996 | 1.5 | 1997 | 1.5 |
| 1987 | 1.5 | 1988 | 1.5 | 1989 | 1.5 | 1990 | 1.4 | 1991 | 1.4 | 1992 | 1.4 | 1993 | 1.4 | 1994 | 1.4 | 1995 | 1.4 | 1996 | 1.4 | 1997 | 1.4 | 1998 | 1.4 |
| 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 | 1993 | 1.3 | 1994 | 1.3 | 1995 | 1.3 | 1996 | 1.3 | 1997 | 1.3 | 1998 | 1.3 | 1999 | 1.3 |
| 1989 | 1.2 | 1990 | 1.1 | 1991 | 1.1 | 1992 | 1.1 | 1993 | 1.1 | 1994 | 1.1 | 1995 | 1.1 | 1996 | 1.1 | 1997 | 1.1 | 1998 | 1.1 | 1999 | 1.1 | 2000 | 1.1 |
| 1990 | 1.0 | 1991 | 1.0 | 1992 | 1.0 | 1993 | 1.0 | 1994 | 1.0 | 1995 | 1.0 | 1996 | 1.0 | 1997 | 1.0 | 1998 | 1.0 | 1999 | 1.0 | 2000 | 1.0 | 2001 | 1.0 |
| 1991 | 0.9 | 1992 | 0.9 | 1993 | 0.9 | 1994 | 0.9 | 1995 | 0.9 | 1996 | 0.9 | 1997 | 0.9 | 1998 | 0.9 | 1999 | 0.9 | 2000 | 0.9 | 2001 | 0.9 | 2002 | 0.9 |
| 1992 | 0.8 | 1993 | 0.8 | 1994 | 0.8 | 1995 | 0.8 | 1996 | 0.8 | 1997 | 0.8 | 1998 | 0.8 | 1999 | 0.8 | 2000 | 0.8 | 2001 | 0.8 | 2002 | 0.8 | 2003 | 0.8 |

*MY Indicates the model year.

**E Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.1.4.

TABLE 1.1.2B

DATE : MAY 25, 1985

# EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
# LIGHT DUTY GASOLINE POWERED VEHICLES
# CO

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 111.8 | 1962 | 111.8 | 1963 | 111.8 | 1964 | 111.8 | 1965 | 111.8 | 1966 | 111.8 | 1967 | 111.8 | 1968 | 94.5 | 1969 | 94.5 | 1970 | 89.2 | 1971 | 89.2 | 1972 | 77.4 |
| 1962 | 110.8 | 1963 | 110.8 | 1964 | 110.8 | 1965 | 110.8 | 1966 | 110.8 | 1967 | 110.8 | 1968 | 93.4 | 1969 | 93.4 | 1970 | 87.7 | 1971 | 87.7 | 1972 | 76.3 | 1973 | 76.3 |
| 1963 | 109.7 | 1964 | 109.7 | 1965 | 109.7 | 1966 | 109.7 | 1967 | 109.7 | 1968 | 92.1 | 1969 | 92.1 | 1970 | 86.2 | 1971 | 86.2 | 1972 | 75.1 | 1973 | 75.1 | 1974 | 75.1 |
| 1964 | 108.5 | 1965 | 108.5 | 1966 | 108.5 | 1967 | 108.5 | 1968 | 90.8 | 1969 | 90.8 | 1970 | 84.6 | 1971 | 84.6 | 1972 | 73.8 | 1973 | 73.8 | 1974 | 73.8 | 1975 | 53.4 |
| 1965 | 107.3 | 1966 | 107.3 | 1967 | 107.3 | 1968 | 89.4 | 1969 | 89.4 | 1970 | 82.9 | 1971 | 82.9 | 1972 | 72.5 | 1973 | 72.5 | 1974 | 72.5 | 1975 | 52.0 | 1976 | 52.0 |
| 1966 | 106.0 | 1967 | 106.0 | 1968 | 87.9 | 1969 | 87.9 | 1970 | 81.1 | 1971 | 81.1 | 1972 | 71.1 | 1973 | 71.1 | 1974 | 71.1 | 1975 | 50.5 | 1976 | 50.5 | 1977 | 50.5 |
| 1967 | 104.6 | 1968 | 86.4 | 1969 | 86.4 | 1970 | 79.1 | 1971 | 79.1 | 1972 | 69.6 | 1973 | 69.6 | 1974 | 69.6 | 1975 | 48.9 | 1976 | 48.9 | 1977 | 48.9 | 1978 | 48.9 |
| 1968 | 84.7 | 1969 | 84.7 | 1970 | 77.1 | 1971 | 77.1 | 1972 | 68.0 | 1973 | 68.0 | 1974 | 68.0 | 1975 | 47.2 | 1976 | 47.2 | 1977 | 47.2 | 1978 | 47.2 | 1979 | 47.2 |
| 1969 | 82.9 | 1970 | 74.9 | 1971 | 74.9 | 1972 | 66.3 | 1973 | 66.3 | 1974 | 66.3 | 1975 | 45.4 | 1976 | 45.4 | 1977 | 45.4 | 1978 | 45.4 | 1979 | 45.4 | 1980 | 13.7 |
| 1970 | 72.7 | 1971 | 72.7 | 1972 | 64.5 | 1973 | 64.5 | 1974 | 64.5 | 1975 | 43.5 | 1976 | 43.5 | 1977 | 43.5 | 1978 | 43.5 | 1979 | 43.5 | 1980 | 13.2 | 1981 | 20.7 |
| 1971 | 70.2 | 1972 | 62.6 | 1973 | 62.6 | 1974 | 62.6 | 1975 | 41.5 | 1976 | 41.5 | 1977 | 41.5 | 1978 | 41.5 | 1979 | 41.5 | 1980 | 12.7 | 1981 | 19.3 | 1982 | 18.3 |
| 1972 | 60.6 | 1973 | 60.6 | 1974 | 60.6 | 1975 | 39.4 | 1976 | 39.4 | 1977 | 39.4 | 1978 | 39.4 | 1979 | 39.4 | 1980 | 12.1 | 1981 | 17.7 | 1982 | 16.8 | 1983 | 16.7 |
| 1973 | 58.5 | 1974 | 58.5 | 1975 | 37.2 | 1976 | 37.2 | 1977 | 37.2 | 1978 | 37.2 | 1979 | 37.2 | 1980 | 11.4 | 1981 | 16.1 | 1982 | 15.1 | 1983 | 15.0 | 1984 | 16.2 |
| 1974 | 56.3 | 1975 | 34.8 | 1976 | 34.8 | 1977 | 34.8 | 1978 | 34.8 | 1979 | 34.8 | 1980 | 10.8 | 1981 | 14.3 | 1982 | 13,4 | 1983 | 13.3 | 1984 | 14.3 | 1985 | 13.6 |
| 1975 | 32.3 | 1976 | 32.3 | 1977 | 32.3 | 1978 | 32.3 | 1979 | 32.3 | 1980 | 10.0 | 1981 | 12.5 | 1982 | 11.5 | 1983 | 11.4 | 1984 | 12.3 | 1985 | 11.7 | 1986 | 11.7 |
| 1976 | 29.6 | 1977 | 29.6 | 1978 | 29.6 | 1979 | 29.6 | 1980 | 9.3 | 1981 | 10.5 | 1982 | 9.5 | 1983 | 9.5 | 1984 | 10.1 | 1985 | 9.7 | 1986 | 9.7 | 1987 | 9.4 |
| 1977 | 26.8 | 1978 | 26.8 | 1979 | 26.8 | 1980 | 8.5 | 1981 | 8.5 | 1982 | 7.5 | 1983 | 7.4 | 1984 | 7.9 | 1985 | 7.6 | 1986 | 7.6 | 1987 | 7.3 | 1988 | 7.3 |
| 1978 | 23.8 | 1979 | 23.8 | 1980 | 7.7 | 1981 | 6.3 | 1982 | 5.2 | 1983 | 5.2 | 1984 | 5.5 | 1985 | 5.3 | 1986 | 5.3 | 1987 | 5.2 | 1988 | 5.2 | 1989 | 5.2 |
| 1979 | 20.6 | 1980 | 6.8 | 1981 | 3.9 | 1982 | 2.9 | 1983 | 2.9 | 1984 | 3.0 | 1985 | 2.9 | 1986 | 2.9 | 1987 | 2.9 | 1988 | 2.9 | 1989 | 2.9 | 1990 | 2.9 |
| 1980 | 6.2 | 1981 | 2.4 | 1982 | 1.4 | 1983 | 1.4 | 1984 | 1.3 | 1985 | 1.3 | 1986 | 1.3 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 | 1991 | 1.4 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 77.4 | 1974 | 77.4 | 1975 | 57.2 | 1976 | 57.2 | 1977 | 57.2 | 1978 | 57.2 | 1979 | 57.2 | 1980 | 17.1 | 1981 | 30.8 | 1982 | 29.9 | 1983 | 29.7 | 1984 | 32.2 |
| 1974 | 76.3 | 1975 | 56.0 | 1976 | 56.0 | 1977 | 56.0 | 1978 | 56.0 | 1979 | 56.0 | 1980 | 16.7 | 1981 | 29.9 | 1982 | 29.0 | 1983 | 28.8 | 1984 | 31.2 | 1985 | 29.7 |
| 1975 | 54.7 | 1976 | 54.7 | 1977 | 54.7 | 1978 | 54.7 | 1979 | 54.7 | 1980 | 16.4 | 1981 | 29.0 | 1982 | 28.1 | 1983 | 27.9 | 1984 | 30.2 | 1985 | 28.7 | 1986 | 28.7 |
| 1976 | 53.4 | 1977 | 53.4 | 1978 | 53.4 | 1979 | 53.4 | 1980 | 16.0 | 1981 | 28.0 | 1982 | 27.1 | 1983 | 26.9 | 1984 | 29.2 | 1985 | 27.7 | 1986 | 27.7 | 1987 | 26.6 |
| 1977 | 52.0 | 1978 | 52.0 | 1979 | 52.0 | 1980 | 15.6 | 1981 | 26.9 | 1982 | 26.0 | 1983 | 25.9 | 1984 | 28.0 | 1985 | 26.6 | 1986 | 26.6 | 1987 | 25.5 | 1988 | 25.5 |
| 1978 | 50.5 | 1979 | 50.5 | 1980 | 15.2 | 1981 | 25.8 | 1982 | 24.9 | 1983 | 21.8 | 1984 | 26.8 | 1985 | 25.5 | 1986 | 25.5 | 1987 | 24.4 | 1988 | 24.4 | 1989 | 24.4 |
| 1979 | 48.9 | 1980 | 14.7 | 1981 | 24.7 | 1982 | 23.8 | 1983 | 23.6 | 1984 | 25.6 | 1985 | 24.3 | 1986 | 24.3 | 1987 | 23.3 | 1988 | 23.3 | 1989 | 23.3 | 1990 | 22.7 |
| 1980 | 14.3 | 1981 | 23.4 | 1982 | 22.5 | 1983 | 22.4 | 1984 | 24.2 | 1985 | 23.0 | 1986 | 23.0 | 1987 | 22.1 | 1988 | 22.1 | 1989 | 22.1 | 1990 | 21.5 | 1991 | 21.5 |
| 1981 | 22.1 | 1982 | 21.2 | 1983 | 21.1 | 1984 | 22.8 | 1985 | 21.7 | 1986 | 21.7 | 1987 | 20.8 | 1988 | 20.8 | 1989 | 20.8 | 1990 | 20.3 | 1991 | 20.3 | 1992 | 20.3 |
| 1982 | 19.8 | 1983 | 19.7 | 1984 | 21.3 | 1985 | 20.2 | 1986 | 20.2 | 1987 | 19.4 | 1988 | 19.4 | 1989 | 19.4 | 1990 | 19.0 | 1991 | 19.0 | 1992 | 19.0 | 1993 | 19.0 |
| 1983 | 18.2 | 1984 | 19.7 | 1985 | 18.7 | 1986 | 18.7 | 1987 | 18.0 | 1988 | 18.0 | 1989 | 18.0 | 1990 | 17.6 | 1991 | 17.6 | 1992 | 17.6 | 1993 | 17.6 | 1994 | 17.6 |
| 1984 | 18.0 | 1985 | 17.1 | 1986 | 17.1 | 1987 | 16.5 | 1988 | 16.5 | 1989 | 16.5 | 1990 | 16.1 | 1991 | 16.1 | 1992 | 16.1 | 1993 | 16.1 | 1994 | 16.1 | 1995 | 16.1 |
| 1985 | 15.4 | 1986 | 15.4 | 1987 | 14.8 | 1988 | 14.8 | 1989 | 14.8 | 1990 | 14.5 | 1991 | 14.5 | 1992 | 14.5 | 1993 | 14.5 | 1994 | 14.5 | 1995 | 14.5 | 1996 | 14.5 |
| 1986 | 13.6 | 1987 | 13.1 | 1988 | 13.1 | 1989 | 13.1 | 1990 | 12.8 | 1991 | 12.8 | 1992 | 12.8 | 1993 | 12.8 | 1994 | 12.8 | 1995 | 12.8 | 1996 | 12.8 | 1997 | 12.8 |
| 1987 | 11.3 | 1988 | 11.3 | 1989 | 11.3 | 1990 | 11.1 | 1991 | 11.1 | 1992 | 11.1 | 1993 | 11.1 | 1994 | 11.1 | 1995 | 11.1 | 1996 | 11.1 | 1997 | 11.1 | 1998 | 11.1 |
| 1988 | 9.4 | 1989 | 9.4 | 1990 | 9.2 | 1991 | 9.2 | 1992 | 9.2 | 1993 | 9.2 | 1994 | 9.2 | 1995 | 9.2 | 1996 | 9.2 | 1997 | 9.2 | 1998 | 9.2 | 1999 | 9.2 |
| 1989 | 7.3 | 1990 | 7.2 | 1991 | 7.2 | 1992 | 7.2 | 1993 | 7.2 | 1994 | 7.2 | 1995 | 7.2 | 1996 | 7.2 | 1997 | 7.2 | 1998 | 7.2 | 1999 | 7.2 | 2000 | 7.2 |
| 1990 | 5.1 | 1991 | 5.1 | 1992 | 5.1 | 1993 | 5.1 | 1994 | 5.1 | 1995 | 5.1 | 1996 | 5.1 | 1997 | 5.1 | 1998 | 5.1 | 1999 | 5.1 | 2000 | 5.1 | 2001 | 5.1 |
| 1991 | 2.9 | 1992 | 2.9 | 1993 | 2.9 | 1994 | 2.9 | 1995 | 2.9 | 1996 | 2.9 | 1997 | 2.9 | 1998 | 2.9 | 1999 | 2.9 | 2000 | 2.9 | 2001 | 2.9 | 2002 | 2.9 |
| 1992 | 1.4 | 1993 | 1.4 | 1994 | 1.4 | 1995 | 1.4 | 1996 | 1.4 | 1997 | 1.4 | 1998 | 1.4 | 1999 | 1.4 | 2000 | 1.4 | 2001 | 1.4 | 2002 | 1.4 | 2003 | 1.4 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.1.4.

## TABLE 1.1.2C

DATE : MAY 25, 1985

### EXHAUST EMISSION LEVELS FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED VEHICLES
### NOx

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 3.4 | 1962 | 3.4 | 1963 | 3.4 | 1964 | 3.4 | 1965 | 3.4 | 1966 | 3.4 | 1967 | 3.4 | 1968 | 4.3 | 1969 | 4.3 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 |
| 1962 | 3.4 | 1963 | 3.4 | 1964 | 3.4 | 1965 | 3.4 | 1966 | 3.4 | 1967 | 3.4 | 1968 | 4.3 | 1969 | 4.3 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 3.4 |
| 1963 | 3.4 | 1964 | 3.4 | 1965 | 3.4 | 1966 | 3.4 | 1967 | 3.4 | 1968 | 4.3 | 1969 | 4.3 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 3.4 | 1974 | 3.4 |
| 1964 | 3.4 | 1965 | 3.4 | 1966 | 3.4 | 1967 | 3.4 | 1968 | 4.3 | 1969 | 4.3 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 3.4 | 1974 | 3.4 | 1975 | 2.8 |
| 1965 | 3.4 | 1966 | 3.4 | 1967 | 3.4 | 1968 | 4.3 | 1969 | 4.3 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 3.4 | 1974 | 3.4 | 1975 | 2.8 | 1976 | 2.8 |
| 1966 | 3.4 | 1967 | 3.4 | 1968 | 4.3 | 1969 | 4.3 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 3.4 | 1974 | 3.4 | 1975 | 2.8 | 1976 | 2.8 | 1977 | 2.8 |
| 1967 | 3.4 | 1968 | 4.3 | 1969 | 4.3 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 3.3 | 1974 | 3.3 | 1975 | 2.8 | 1976 | 2.8 | 1977 | 2.8 | 1978 | 2.8 |
| 1968 | 4.3 | 1969 | 4.3 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 3.3 | 1974 | 3.3 | 1975 | 2.8 | 1976 | 2.8 | 1977 | 2.7 | 1978 | 2.7 | 1979 | 2.7 |
| 1969 | 4.3 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 3.3 | 1974 | 3.3 | 1975 | 2.7 | 1976 | 2.7 | 1977 | 2.6 | 1978 | 2.6 | 1979 | 2.6 | 1980 | 2.2 |
| 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 3.3 | 1974 | 3.3 | 1975 | 2.7 | 1976 | 2.7 | 1977 | 2.6 | 1978 | 2.6 | 1979 | 2.6 | 1980 | 2.2 | 1981 | 1.4 |
| 1971 | 4.3 | 1972 | 4.3 | 1973 | 3.2 | 1974 | 3.2 | 1975 | 2.7 | 1976 | 2.7 | 1977 | 2.5 | 1978 | 2.5 | 1979 | 2.5 | 1980 | 2.1 | 1981 | 1.3 | 1982 | 1.4 |
| 1972 | 4.3 | 1973 | 3.2 | 1974 | 3.2 | 1975 | 2.7 | 1976 | 2.7 | 1977 | 2.4 | 1978 | 2.4 | 1979 | 2.4 | 1980 | 2.1 | 1981 | 1.2 | 1982 | 1.3 | 1983 | 1.2 |
| 1973 | 3.2 | 1974 | 3.2 | 1975 | 2.7 | 1976 | 2.7 | 1977 | 2.4 | 1978 | 2.4 | 1979 | 2.4 | 1980 | 2.0 | 1981 | 1.2 | 1982 | 1.2 | 1983 | 1.1 | 1984 | 1.2 |
| 1974 | 3.1 | 1975 | 2.6 | 1976 | 2.6 | 1977 | 2.3 | 1978 | 2.3 | 1979 | 2.3 | 1980 | 1.9 | 1981 | 1.1 | 1982 | 1.1 | 1983 | 1.1 | 1984 | 1.1 | 1985 | 1.1 |
| 1975 | 2.6 | 1976 | 2.6 | 1977 | 2.2 | 1978 | 2.2 | 1979 | 2.2 | 1980 | 1.9 | 1981 | 1.0 | 1982 | 1.1 | 1983 | 1.0 | 1984 | 1.0 | 1985 | 1.0 | 1986 | 1.0 |
| 1976 | 2.6 | 1977 | 2.1 | 1978 | 2.1 | 1979 | 2.1 | 1980 | 1.8 | 1981 | 0.9 | 1982 | 1.0 | 1983 | 0.9 | 1984 | 0.9 | 1985 | 0.9 | 1986 | 0.9 | 1987 | 1.0 |
| 1977 | 2.0 | 1978 | 2.0 | 1979 | 2.0 | 1980 | 1.7 | 1981 | 0.9 | 1982 | 0.9 | 1983 | 0.8 | 1984 | 0.8 | 1985 | 0.8 | 1986 | 0.8 | 1987 | 0.9 | 1988 | 0.9 |
| 1978 | 1.9 | 1979 | 1.9 | 1980 | 1.6 | 1981 | 0.8 | 1982 | 0.8 | 1983 | 0.7 | 1984 | 0.7 | 1985 | 0.7 | 1986 | 0.7 | 1987 | 0.7 | 1988 | 0.7 | 1989 | 0.7 |
| 1979 | 1.8 | 1980 | 1.6 | 1981 | 0.7 | 1982 | 0.7 | 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 |
| 1980 | 1.5 | 1981 | 0.6 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.5 | 1985 | 0.5 | 1986 | 0.5 | 1987 | 0.5 | 1988 | 0.5 | 1989 | 0.5 | 1990 | 0.5 | 1991 | 0.5 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 3.5 | 1974 | 3.5 | 1975 | 2.9 | 1976 | 2.9 | 1977 | 3.1 | 1978 | 3.1 | 1979 | 3.1 | 1980 | 2.6 | 1981 | 1.8 | 1982 | 1.8 | 1983 | 1.8 | 1984 | 1.9 |
| 1974 | 3.4 | 1975 | 2.9 | 1976 | 2.9 | 1977 | 3.0 | 1978 | 3.0 | 1979 | 3.0 | 1980 | 2.5 | 1981 | 1.8 | 1982 | 1.8 | 1983 | 1.7 | 1984 | 1.8 | 1985 | 1.8 |
| 1975 | 2.9 | 1976 | 2.9 | 1977 | 3.0 | 1978 | 3.0 | 1979 | 3.0 | 1980 | 2.5 | 1981 | 1.7 | 1982 | 1.8 | 1983 | 1.7 | 1984 | 1.8 | 1985 | 1.8 | 1986 | 1.8 |
| 1976 | 2.8 | 1977 | 2.9 | 1978 | 2.9 | 1979 | 2.9 | 1980 | 2.4 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.6 | 1984 | 1.8 | 1985 | 1.8 | 1986 | 1.8 | 1987 | 1.9 |
| 1977 | 2.9 | 1978 | 2.9 | 1979 | 2.9 | 1980 | 2.4 | 1981 | 1.6 | 1982 | 1.7 | 1983 | 1.6 | 1984 | 1.7 | 1985 | 1.7 | 1986 | 1.7 | 1987 | 1.8 | 1988 | 1.8 |
| 1978 | 2.8 | 1979 | 2.8 | 1980 | 2.4 | 1981 | 1.6 | 1982 | 1.6 | 1983 | 1.6 | 1984 | 1.7 | 1985 | 1.7 | 1986 | 1.7 | 1987 | 1.8 | 1988 | 1.8 | 1989 | 1.8 |
| 1979 | 2.8 | 1980 | 2.3 | 1981 | 1.5 | 1982 | 1.6 | 1983 | 1.5 | 1984 | 1.6 | 1985 | 1.6 | 1986 | 1.6 | 1987 | 1.7 | 1988 | 1.7 | 1989 | 1.7 | 1990 | 1.7 |
| 1980 | 2.3 | 1981 | 1.5 | 1982 | 1.5 | 1983 | 1.5 | 1984 | 1.5 | 1985 | 1.5 | 1986 | 1.5 | 1987 | 1.7 | 1988 | 1.7 | 1989 | 1.7 | 1990 | 1.7 | 1991 | 1.7 |
| 1981 | 1.4 | 1982 | 1.5 | 1983 | 1.4 | 1984 | 1.5 | 1985 | 1.5 | 1986 | 1.5 | 1987 | 1.6 | 1988 | 1.6 | 1989 | 1.6 | 1990 | 1.6 | 1991 | 1.6 | 1992 | 1.6 |
| 1982 | 1.4 | 1983 | 1.3 | 1984 | 1.4 | 1985 | 1.4 | 1986 | 1.4 | 1987 | 1.5 | 1988 | 1.5 | 1989 | 1.5 | 1990 | 1.5 | 1991 | 1.5 | 1992 | 1.5 | 1993 | 1.5 |
| 1983 | 1.3 | 1984 | 1.3 | 1985 | 1.3 | 1986 | 1.3 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 | 1991 | 1.4 | 1992 | 1.4 | 1993 | 1.4 | 1994 | 1.4 |
| 1984 | 1.3 | 1985 | 1.3 | 1986 | 1.3 | 1987 | 1.3 | 1988 | 1.3 | 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 | 1993 | 1.3 | 1994 | 1.3 | 1995 | 1.3 |
| 1985 | 1.2 | 1986 | 1.2 | 1987 | 1.3 | 1988 | 1.3 | 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 | 1993 | 1.3 | 1994 | 1.3 | 1995 | 1.3 | 1996 | 1.3 |
| 1986 | 1.1 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 | 1991 | 1.2 | 1992 | 1.2 | 1993 | 1.2 | 1994 | 1.2 | 1995 | 1.2 | 1996 | 1.2 | 1997 | 1.2 |
| 1987 | 1.1 | 1988 | 1.1 | 1989 | 1.1 | 1990 | 1.1 | 1991 | 1.1 | 1992 | 1.1 | 1993 | 1.1 | 1994 | 1.1 | 1995 | 1.1 | 1996 | 1.1 | 1997 | 1.1 | 1998 | 1.1 |
| 1988 | 1.0 | 1989 | 1.0 | 1990 | 1.0 | 1991 | 1.0 | 1992 | 1.0 | 1993 | 1.0 | 1994 | 1.0 | 1995 | 1.0 | 1996 | 1.0 | 1997 | 1.0 | 1998 | 1.0 | 1999 | 1.0 |
| 1989 | 0.9 | 1990 | 0.9 | 1991 | 0.9 | 1992 | 0.9 | 1993 | 0.9 | 1994 | 0.9 | 1995 | 0.9 | 1996 | 0.9 | 1997 | 0.9 | 1998 | 0.9 | 1999 | 0.9 | 2000 | 0.9 |
| 1990 | 0.7 | 1991 | 0.7 | 1992 | 0.7 | 1993 | 0.7 | 1994 | 0.7 | 1995 | 0.7 | 1996 | 0.7 | 1997 | 0.7 | 1998 | 0.7 | 1999 | 0.7 | 2000 | 0.7 | 2001 | 0.7 |
| 1991 | 0.6 | 1992 | 0.6 | 1993 | 0.6 | 1994 | 0.6 | 1995 | 0.6 | 1996 | 0.6 | 1997 | 0.6 | 1998 | 0.6 | 1999 | 0.6 | 2000 | 0.6 | 2001 | 0.6 | 2002 | 0.6 |
| 1992 | 0.5 | 1993 | 0.5 | 1994 | 0.5 | 1995 | 0.5 | 1996 | 0.5 | 1997 | 0.5 | 1998 | 0.5 | 1999 | 0.5 | 2000 | 0.5 | 2001 | 0.5 | 2002 | 0.5 | 2003 | 0.5 |

*MY -- Indicates the model year

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.1.4

TABLE 1.1.3

IDLE EMISSION RATES FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED VEHICLES

* IER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Min.) | Deterioration Rate (Gm/Min/10K Mi) |
|---|---|---|---|
| HC | Pre-1968 | 1.32 | 0.03 |
| | 1968-1969 | 1.07 | 0.06 |
| | 1970-1971 | 0.54 | 0.07 |
| | 1972-1974 | 0.72 | 0.07 |
| | 1975-1979 | 0.30 | 0.07 |
| | 1980 | 0.07 | 0.04 |
| | 1981 | 0.09 | 0.04 |
| | 1982 | 0.09 | 0.04 |
| | 1983 | 0.09 | 0.04 |
| | 1984 | 0.09 | 0.04 |
| | 1985-1989 | 0.09 | 0.04 |
| | 1990+ | 0.09 | 0.04 |
| CO | Pre-1968 | 13.76 | 0.40 |
| | 1968-1969 | 13.99 | 0.63 |
| | 1970-1971 | 11.84 | 0.88 |
| | 1972-1974 | 12.66 | 0.76 |
| | 1975-1979 | 6.00 | 0.85 |
| | 1980 | 1.83 | 0.85 |
| | 1981 | 1.63 | 0.82 |
| | 1982 | 1.55 | 0.81 |
| | 1983 | 1.48 | 0.82 |
| | 1984 | 1.48 | 0.82 |
| | 1985-1986 | 1.48 | 0.82 |
| | 1987-1989 | 1.48 | 0.82 |
| | 1990+ | 1.48 | 0.82 |
| NOx | Pre-1968 | 0.09 | 0.0 |
| | 1968-1972 | 0.17 | 0.0 |
| | 1973-1974 | 0.14 | 0.0 |
| | 1975-1976 | 0.26 | 0.0 |
| | 1977-1979 | 0.18 | 0.01 |
| | 1980 | 0.17 | 0.01 |
| | 1981 | 0.08 | 0.01 |
| | 1982 | 0.08 | 0.01 |
| | 1983 | 0.08 | 0.01 |
| | 1984 | 0.08 | 0.01 |
| | 1985-1986 | 0.08 | 0.01 |
| | 1987-1989 | 0.08 | 0.01 |
| | 1990+ | 0.08 | 0.01 |

* WHERE :
IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

DATE : MAY 25, 1985

## TABLE 1.1.4

## REGISTRATION MIX AND MILEAGE ACCUMULATION RATES FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED VEHICLES

| Model Year Index** | July 1 Registration Mix* | Mileage Accumulation Rate per vehicle* | Jan 1 Registration Mix | Jan 1 Mileage Accumulation Rate (fleet) | Jan 1 Mileage Accumulation (fleet) |
|---|---|---|---|---|---|
| 1 | 0.080 | 12818. | 0.027 | 12818. | 1602. |
| 2 | 0.101 | 12102. | 0.101 | 12639. | 9591. |
| 3 | 0.095 | 11427. | 0.095 | 11933. | 21873. |
| 4 | 0.089 | 10789. | 0.089 | 11267. | 33470. |
| 5 | 0.083 | 10187. | 0.083 | 10638. | 44420. |
| 6 | 0.077 | 9619. | 0.077 | 10045. | 54758. |
| 7 | 0.071 | 9082. | 0.071 | 9485. | 64520. |
| 8 | 0.065 | 8575. | 0.065 | 8955. | 73738. |
| 9 | 0.059 | 8096. | 0.059 | 8455. | 82440. |
| 10 | 0.053 | 7645. | 0.053 | 7983. | 90657. |
| 11 | 0.047 | 7218. | 0.047 | 7538. | 98415. |
| 12 | 0.041 | 6815. | 0.041 | 7117. | 105740. |
| 13 | 0.035 | 6435. | 0.035 | 6720. | 112657. |
| 14 | 0.029 | 6076. | 0.029 | 6345. | 119187. |
| 15 | 0.023 | 5737. | 0.023 | 5991. | 125354. |
| 16 | 0.017 | 5416. | 0.017 | 5657. | 131176. |
| 17 | 0.011 | 5114. | 0.011 | 5340. | 136673. |
| 18 | 0.008 | 4829. | 0.008 | 5043. | 141863. |
| 19 | 0.006 | 4559. | 0.006 | 4761. | 146763. |
| 20+ | 0.008 | 4305. | 0.008 | 4495. | 151390. |

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

DATE : MAY 25, 1985

## TABLE 1.1.5

## EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED VEHICLES JANUARY 1, 1988

| Model Years | (A) LDV Fleet Registration | (B) Sales Fraction | (A*B) | (C=A*B/DAF) LDGV Registration | (D) Annual Mileage Accrual Rate | (C*D) | (C*D/TFNORM) Travel Fractions |
|---|---|---|---|---|---|---|---|
| 1988 | 0.027 | 0.910 | 0.024 | 0.027 | 12818. | 345.4 | 0.036 |
| 1987 | 0.101 | 0.920 | 0.093 | 0.103 | 12639. | 1304.3 | 0.137 |
| 1986 | 0.095 | 0.923 | 0.088 | 0.097 | 11933. | 1162.1 | 0.122 |
| 1985 | 0.089 | 0.934 | 0.083 | 0.092 | 11267. | 1040.2 | 0.109 |
| 1984 | 0.083 | 0.940 | 0.078 | 0.087 | 10638. | 921.8 | 0.097 |
| 1983 | 0.077 | 0.947 | 0.073 | 0.081 | 10045. | 813.5 | 0.085 |
| 1982 | 0.071 | 0.954 | 0.068 | 0.075 | 9485. | 713.5 | 0.075 |
| 1981 | 0.065 | 0.939 | 0.061 | 0.068 | 8955. | 607.0 | 0.064 |
| 1980 | 0.059 | 0.966 | 0.057 | 0.063 | 8455. | 535.2 | 0.056 |
| 1979 | 0.053 | 0.972 | 0.052 | 0.057 | 7983. | 456.7 | 0.048 |
| 1978 | 0.047 | 0.991 | 0.047 | 0.052 | 7538. | 389.9 | 0.041 |
| 1977 | 0.041 | 0.996 | 0.041 | 0.045 | 7117. | 322.8 | 0.034 |
| 1976 | 0.035 | 0.997 | 0.035 | 0.039 | 6720. | 260.4 | 0.027 |
| 1975 | 0.029 | 0.997 | 0.029 | 0.032 | 6345. | 203.7 | 0.021 |
| 1974 | 0.023 | 1.000 | 0.023 | 0.026 | 5991. | 153.0 | 0.016 |
| 1973 | 0.017 | 1.000 | 0.017 | 0.019 | 5657. | 106.8 | 0.011 |
| 1972 | 0.011 | 1.000 | 0.011 | 0.012 | 5340. | 65.2 | 0.007 |
| 1971 | 0.008 | 1.000 | 0.008 | 0.009 | 5043. | 44.8 | 0.005 |
| 1970 | 0.006 | 1.000 | 0.006 | 0.007 | 4761. | 31.7 | 0.003 |
| 1969- | 0.008 | 1.000 | 0.008 | 0.009 | 4495. | 39.9 | 0.004 |
|  |  | DAF: | 0.902 |  | TFNORM: | 9518.0 |  |

WHERE :

A = January 1 registration mix from Table 1.1.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 1.1.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI) = .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

NOTE : In general, the travel weighting fractions will change for every calendar year since the sales fraction (column B) changes for almost every model year.

DATE : MAY 25, 1985

## TABLE 1.1.6

## SPEED CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED VEHICLES

* SCF(s,sadj) = SF(s)/SF(sadj)

SF(s) = EXP(A + B*s + C*$s^2$ + D*$S^3$ + E*$s^4$ + F*$s^5$), HC & CO
= A + B*s + C*$s^2$ + D*$s^3$ + E*$s^4$ + F*$s^5$ , NOx,Pre-1978
= EXP(A + B*s + C*$s^2$ + D*$s^3$ + E*$s^4$ + F*$s^5$), NOx,1978+

| Pollutant and Model Years | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| HC | | | | | | |
| Pre-1968 | 0.231026E+01 | -0.289572E+00 | 0.152990E-01 | -0.446689E-03 | 0.648183E-05 | -0.363456E-07 |
| 1968 | 0.239726E+01 | -0.299985E+00 | 0.161351E-01 | -0.487491E-03 | 0.729093E-05 | -0.419769E-07 |
| 1969 | 0.240873E+01 | -0.308187E+00 | 0.168168E-01 | -0.506843E-03 | 0.753855E-05 | -0.431596E-07 |
| 1970 | 0.223217E+01 | -0.284985E+00 | 0.153833E-01 | -0.456738E-03 | 0.673486E-05 | -0.383798E-07 |
| 1971 | 0.225223E+01 | -0.287778E+00 | 0.156820E-01 | -0.473179E-03 | 0.707954E-05 | -0.408456E-07 |
| 1972 | 0.234948E+01 | -0.304959E+00 | 0.168416E-01 | -0.509623E-03 | 0.759516E-05 | -0.434963E-07 |
| 1973-1974 | 0.268382E+01 | -0.344633E+00 | 0.195417E-01 | -0.625720E-03 | 0.978442E-05 | -0.583369E-07 |
| 1975-1977 | 0.239540E+01 | -0.335781E+00 | 0.211609E-01 | -0.731550E-03 | 0.120715E-04 | -0.748566E-07 |
| 1978-1979 | 0.121545E+01 | -0.707633E-01 | 0.446460E-03 | 0.0 | 0.0 | 0.0 |
| 1980 | 0.144386E+01 | -0.880857E-01 | 0.735680E-03 | 0.0 | 0.0 | 0.0 |
| 1981+ | 0.984090E+00 | -0.567319E-01 | 0.332820E-03 | 0.0 | 0.0 | 0.0 |
| CO | | | | | | |
| Pre-1968 | 0.233989E+01 | -0.296978E+00 | 0.160071E-01 | -0.477396E-03 | 0.706752E-05 | -0.403978E-07 |
| 1968 | 0.246551E+01 | -0.305023E+00 | 0.160497E-01 | -0.473969E-03 | 0.699075E-05 | -0.399758E-07 |
| 1969 | 0.277804E+01 | -0.319130E+00 | 0.153183E-01 | -0.422327E-03 | 0.584948E-05 | -0.314969E-07 |
| 1970 | 0.278899E+01 | -0.327107E+00 | 0.162943E-01 | -0.467573E-03 | 0.671906E-05 | -0.374401E-07 |
| 1971 | 0.270743E+01 | -0.331038E+00 | 0.176179E-01 | -0.538583E-03 | 0.817402E-05 | -0.477803E-07 |
| 1972 | 0.268454E+01 | -0.332817E+00 | 0.176277E-01 | -0.524123E-03 | 0.772221E-05 | -0.437025E-07 |
| 1973-1974 | 0.283929E+01 | -0.368756E+00 | 0.210782E-01 | -0.676438E-03 | 0.106267E-04 | -0.636405E-07 |
| 1975-1977 | 0.248747E+01 | -0.391562E+00 | 0.270721E-01 | -0.976178E-03 | 0.165270E-04 | -0.104317E-06 |
| 1978-1979 | 0.116177E+01 | -0.592737E-01 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1980 | 0.881952E+00 | -0.449976E-01 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1981+ | 0.858419E+00 | -0.437969E-01 | 0.0 | 0.0 | 0.0 | 0.0 |
| NOx | | | | | | |
| Pre-1968 | 0.168635E+01 | -0.118303E+00 | 0.654975E-02 | -0.137139E-03 | 0.100849E-05 | 0.0 |
| 1968 | 0.122677E+01 | -0.444978E-01 | 0.262476E-02 | -0.567150E-04 | 0.434293E-06 | 0.0 |
| 1969 | 0.101743E+01 | -0.118958E-01 | 0.914365E-03 | -0.215740E-04 | 0.182300E-06 | 0.0 |
| 1970 | 0.987600E+00 | -0.195674E-01 | 0.169645E-02 | -0.404000E-04 | 0.328001E-06 | 0.0 |
| 1971 | 0.115917E+01 | -0.444536E-01 | 0.296425E-02 | -0.668990E-04 | 0.522365E-06 | 0.0 |
| 1972 | 0.128169E+01 | -0.804874E-01 | 0.535735E-02 | -0.118891E-03 | 0.901060E-06 | 0.0 |
| 1973-1974 | 0.783838E+00 | 0.328549E-03 | 0.106029E-02 | -0.319350E-04 | 0.290389E-06 | 0.0 |
| 1975-1977 | 0.942131E+00 | -0.423240E-01 | 0.386253E-02 | -0.939853E-04 | 0.753883E-06 | 0.0 |
| 1978-1979 | 0.308282E+00 | -0.230362E-01 | 0.372830E-03 | 0.0 | 0.0 | 0.0 |
| 1980 | 0.295046E+00 | -0.236333E-01 | 0.437750E-03 | 0.0 | 0.0 | 0.0 |
| 1981+ | 0.386041E+00 | -0.262961E-01 | 0.336740E-03 | 0.0 | 0.0 | 0.0 |

* WHERE : s = average speed (mph)
sadj = basic test procedure speed; adjusted for fraction of cold start operation x and fraction of hot start operation w. [ 1/sadj = (w+x)/26 + (1-w-x)/16 ]

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## TABLE 1.1.7A

## TEMPERATURE CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED VEHICLES

* TCF(b) = EXP( TC(b) * (T - 75.0))

| Pol | Model Years | Test segment 1 TC Low | Test segment 1 TC High | Test segment 2 TC Low | Test segment 2 TC High | Test segment 3 TC Low | Test segment 3 TC High |
|---|---|---|---|---|---|---|---|
| HC | Pre-1968 | -0.20623E-01 | -0.14381E-01 | -0.24032E-02 | 0.13219E-02 | -0.10081E-02 | 0.34799E-02 |
| | 1968-1969 | -0.24462E-01 | -0.12552E-01 | -0.32017E-02 | 0.42667E-02 | -0.86884E-03 | 0.75843E-02 |
| | 1970-1971 | -0.21255E-01 | -0.10888E-01 | -0.52755E-03 | -0.47925E-03 | 0.93659E-03 | 0.76666E-02 |
| | 1972-1974 | -0.21427E-01 | -0.66107E-02 | -0.39442E-03 | 0.26288E-02 | 0.49731E-02 | 0.12320E-01 |
| | 1975-1979 | -0.23517E-01 | -0.14095E-01 | -0.88057E-02 | 0.26179E-01 | -0.16222E-02 | 0.24297E-01 |
| | 1980 | -0.27793E-01 | -0.14095E-01 | -0.10177E-01 | 0.26179E-01 | -0.82680E-02 | 0.24297E-01 |
| | 1981+ | -0.33883E-01 | 0.11959E-01 | -0.10113E-01 | -0.12627E-04 | -0.80650E-02 | 0.78765E-02 |
| CO | Pre-1968 | -0.13487E-01 | -0.14691E-01 | 0.15784E-02 | 0.37462E-02 | 0.11097E-02 | 0.11014E-01 |
| | 1968-1969 | -0.21126E-01 | -0.38767E-01 | -0.15289E-02 | 0.84685E-02 | 0.15749E-02 | 0.25179E-01 |
| | 1970-1971 | -0.20843E-01 | -0.21165E-01 | -0.59951E-02 | 0.23603E-01 | 0.18253E-02 | 0.28483E-01 |
| | 1972-1974 | -0.19091E-01 | -0.13146E-01 | -0.42373E-03 | 0.24717E-01 | 0.57982E-02 | 0.25848E-01 |
| | 1975-1979 | -0.24835E-01 | -0.19612E-01 | -0.88336E-02 | 0.48537E-01 | -0.11553E-02 | 0.31439E-01 |
| | 1980 | see NOTE 2 | -0.19612E-01 | -0.17783E-01 | 0.48537E-01 | -0.10871E-01 | 0.31439E-01 |
| | 1981+ | see NOTE 2 | -0.12596E-01 | -0.18813E-01 | 0.13861E-01 | -0.11951E-01 | 0.96939E-02 |
| NOx | Pre-1968 | -0.16897E-03 | 0.38841E-02 | -0.89245E-02 | -0.87325E-02 | -0.72580E-02 | -0.10839E-01 |
| | 1968-1972 | -0.25074E-03 | -0.10389E-02 | -0.59791E-02 | -0.92466E-02 | -0.62690E-02 | -0.10108E-01 |
| | 1973-1974 | 0.38855E-02 | -0.18301E-01 | -0.24156E-02 | -0.10925E-01 | -0.21188E-02 | -0.18042E-01 |
| | 1975-1976 | -0.45504E-04 | -0.71420E-02 | -0.12575E-02 | -0.87910E-02 | -0.53153E-03 | -0.75470E-02 |
| | 1977-1979 | -0.76044E-02 | -0.26153E-01 | -0.68045E-02 | -0.18603E-01 | -0.54198E-02 | -0.20878E-01 |
| | 1980 | -0.30110E-02 | -0.26153E-01 | -0.67130E-02 | -0.18603E-01 | -0.45310E-02 | -0.20878E-01 |
| | 1981+ | -0.53710E-02 | -0.34416E-01 | -0.65050E-02 | -0.35871E-01 | -0.85650E-02 | -0.28830E-01 |

* WHERE :

TCF(b) = Temperature correction factor for appropriate pollutant, ambient temperature, and model year; for test segment b
T = Ambient temperature (Fahrenheit)
TC(b) = Temperature correction factor coefficient for appropriate pollutant, reference temperature and model year; for test segment b
75.0 = Reference temperature

NOTE 1 : The temperature correction factor is used in conjunction with the Ripstwxn correction factor given in Table 1.1.7B.

NOTE 2 : Offset model used for Bag 1 CO. Offset = -1.3812*(T - 75.0).

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## TABLE 1.1.7B

## NORMALIZED BAG FRACTIONS FOR
## LOW ALTITUDE
## LIGHT DUTY GASOLINE POWERED VEHICLES

| | | Normalized Fractions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Model | Test Seg.#1 | | Test Seg.#2 | | Test Seg.#3 | | Total Test | |
| Pol | Years | B1 | D1 | B2 | D2 | B3 | D3 | BO | DO |
| HC | Pre-1968 | 1.282 | 0.025 | 0.973 | 0.028 | 0.839 | 0.019 | 1.000 | 0.025 |
| | 1968-1969 | 4.345 | 0.074 | 0.946 | 0.054 | 0.842 | 0.048 | 1.000 | 0.056 |
| | 1970-1971 | 1.345 | 0.178 | 0.919 | 0.118 | 0.894 | 0.093 | 1.000 | 0.124 |
| | 1972-1974 | 1.398 | 0.060 | 0.885 | 0.055 | 0.919 | 0.036 | 1.000 | 0.051 |
| | 1975-1979 | 1.856 | 0.345 | 0.765 | 0.233 | 0.802 | 0.196 | 1.000 | 0.246 |
| | 1980 | 2.200 | 0.714 | 0.571 | 0.171 | 0.914 | 0.143 | 1.000 | 0.274 |
| | 1981 | 2.654 | 0.960 | 0.383 | 0.375 | 0.929 | 0.310 | 1.000 | 0.478 |
| | 1982 | 2.609 | 1.101 | 0.387 | 0.435 | 0.957 | 0.365 | 1.000 | 0.553 |
| | 1983 | 2.613 | 1.097 | 0.384 | 0.443 | 0.958 | 0.367 | 1.000 | 0.557 |
| | 1984 | 2.603 | 1.285 | 0.372 | 0.529 | 0.989 | 0.417 | 1.000 | 0.654 |
| | 1985-1986 | 2.617 | 1.173 | 0.371 | 0.510 | 0.981 | 0.404 | 1.000 | 0.618 |
| | 1987-1989 | 2.634 | 1.104 | 0.368 | 0.499 | 0.973 | 0.391 | 1.000 | 0.594 |
| | 1990+ | 2.639 | 1.051 | 0.368 | 0.489 | 0.969 | 0.385 | 1.000 | 0.577 |
| CO | Pre-1968 | 1.277 | 0.033 | 1.017 | 0.029 | 0.758 | 0.025 | 1.000 | 0.029 |
| | 1968-1969 | 1.442 | 0.071 | 0.996 | 0.042 | 0.674 | 0.033 | 1.000 | 0.046 |
| | 1970-1971 | 1.553 | 0.109 | 0.933 | 0.079 | 0.711 | 0.038 | 1.000 | 0.074 |
| | 1972-1974 | 1.573 | 0.054 | 0.902 | 0.079 | 0.755 | 0.029 | 1.000 | 0.060 |
| | 1975-1979 | 1.792 | 0.177 | 0.882 | 0.157 | 0.628 | 0.109 | 1.000 | 0.148 |
| | 1980 | 2.403 | 0.278 | 0.649 | 0.061 | 0.621 | 0.076 | 1.000 | 0.110 |
| | 1981 | 3.724 | 1.325 | 0.0 | 0.792 | 0.853 | 0.659 | 1.000 | 0.865 |
| | 1982 | 3.854 | 2.041 | 0.0 | 1.152 | 0.755 | 1.010 | 1.000 | 1.296 |
| | 1983 | 3.865 | 2.030 | 0.0 | 1.153 | 0.746 | 1.007 | 1.000 | 1.294 |
| | 1984 | 3.959 | 2.285 | 0.0 | 1.351 | 0.675 | 1.163 | 1.000 | 1.492 |
| | 1985-1986 | 3.946 | 2.124 | 0.0 | 1.254 | 0.686 | 1.081 | 1.000 | 1.386 |
| | 1987-1989 | 3.941 | 2.009 | 0.0 | 1.186 | 0.689 | 1.014 | 1.000 | 1.308 |
| | 1990+ | 3.935 | 1.940 | 0.0 | 1.144 | 0.694 | 0.979 | 1.000 | 1.263 |
| NOx | Pre-1968 | 1.121 | 0.009 | 0.785 | 0.001 | 1.319 | -0.009 | 1.000 | 0.0 |
| | 1968-1972 | 1.199 | -0.004 | 0.793 | -0.002 | 1.245 | 0.006 | 1.000 | 0.0 |
| | 1973-1974 | 1.262 | 0.022 | 0.770 | 0.004 | 1.242 | 0.027 | 1.000 | 0.014 |
| | 1975-1976 | 1.297 | 0.012 | 0.781 | 0.004 | 1.194 | 0.016 | 1.000 | 0.009 |
| | 1977-1979 | 1.371 | 0.040 | 0.766 | 0.046 | 1.166 | 0.063 | 1.000 | 0.049 |
| | 1980 | 1.313 | 0.047 | 0.810 | 0.034 | 1.125 | 0.054 | 1.000 | 0.042 |
| | 1981 | 1.752 | 0.129 | 0.737 | 0.123 | 0.935 | 0.173 | 1.000 | 0.138 |
| | 1982 | 1.652 | 0.121 | 0.768 | 0.115 | 0.951 | 0.162 | 1.000 | 0.129 |
| | 1983 | 1.725 | 0.137 | 0.728 | 0.129 | 0.973 | 0.183 | 1.000 | 0.145 |
| | 1984 | 1.817 | 0.167 | 0.707 | 0.148 | 0.942 | 0.219 | 1.000 | 0.172 |
| | 1985-1986 | 1.818 | 0.167 | 0.707 | 0.148 | 0.942 | 0.219 | 1.000 | 0.172 |
| | 1987-1989 | 1.830 | 0.169 | 0.703 | 0.149 | 0.939 | 0.222 | 1.000 | 0.173 |
| | 1990+ | 1.830 | 0.169 | 0.704 | 0.149 | 0.939 | 0.222 | 1.000 | 0.173 |

NOTE : The fractions given in this table are used in the calculation of the operating-mode/ temperature correction factor (OMTCF).

```
WHERE :     OMTCF   = ((TERM1 + TERM2 + TERM3)/DENOM)
            TERM1   =     W    *TCF(1)*(B1+D1*M)
            TERM2   = (1-W-X)*TCF(2)*(B2+D2*M)
            TERM3   =     X    *TCF(3)*(B3+D3*M)
            DENOM   = BO + DO*M
             W      = Fraction of VMT in the cold start mode
             X      = Fraction of VMT in the  hot start mode
            TCF(b)  = Temperature correction factor for pollutant, model
                      year; for test segment b
             M      = Cumulative mileage / 10,000
```

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## TABLE 1.1.8A

## AIR CONDITIONING CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED VEHICLES

* ACCF= U*V*(A + B*(T-75) -1) + 1

| Model Years | HC A | HC B | CO A | CO B | NOx A | NOx B |
|---|---|---|---|---|---|---|
| Pre-1975 | 0.1023E+01 | 0.3344E-02 | 0.1202E+01 | 0.1808E-02 | 0.1299E+01 | 0.5643E-04 |
| 1975+ | 0.1000E+01 | 0.3512E-02 | 0.1130E+01 | 0.1528E-02 | 0.1221E+01 | 0.4262E-03 |

* WHERE :

ACCF = Air Conditioning Correction Factor
V = Fraction of vehicles which are equipped with AC given in Table 1.1.8B
U = Fraction of vehicles with AC that are using it = (DI-DILO)/(DIHI-DI), 0<=U<=1
DI = Discomfort index = (DB+WB)*.4+15
DILO = The highest discomfort index where no AC is used
DIHI = The lowest discomfort index where all vehicles with AC use it
DB = Dry bulb temperature (Fahrenheit)
WB = Wet bulb temperature (Fahrenheit)
T = Ambient temperature (Fahrenheit)

## TABLE 1.1.8B

## ESTIMATED FRACTION OF LOW ALTITUDE LIGHT DUTY GASOLINE POWERED VEHICLES EQUIPPED WITH AIR CONDITIONING

| Model Years | Fraction Equipped With Air Conditioning |
|---|---|
| Pre-1962 | 0.07 |
| 1962-1964 | 0.14 |
| 1965-1966 | 0.24 |
| 1967-1968 | 0.37 |
| 1969-1971 | 0.51 |
| 1972-1976 | 0.61 |
| 1977+ | 0.72 |

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## TABLE 1.1.9

## EXTRA LOAD CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED VEHICLES

* XLCF = (XLC-1)*U + 1

| Model | Coefficients (XLC) | | |
|---|---|---|---|
| Years | HC | CO | NOx |
| Pre-1968 | 1.0786 | 1.2765 | 0.9535 |
| 1968-1969 | 1.0495 | 1.1384 | 1.0313 |
| 1970-1971 | 1.0852 | 1.2478 | 1.0313 |
| 1972 | 1.0556 | 1.1347 | 1.0313 |
| 1973-1974 | 1.0556 | 1.1347 | 1.0753 |
| 1975+ | 1.0455 | 1.3058 | 1.0719 |

* WHERE :

XLCF = Extra load correction factor
U = Fraction of VMT with an extra load
XLC = Correction factor coefficient

## TABLE 1.1.10

## TRAILER TOWING CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED VEHICLES

* TTCF = (TTC-1)*U + 1

| Model | Coefficients (TTC) | | |
|---|---|---|---|
| Years | HC | CO | NOx |
| Pre-1968 | 1.2614 | 1.9327 | 1.1184 |
| 1968-1969 | 1.2762 | 1.8940 | 1.1384 |
| 1970-1971 | 1.4598 | 2.4753 | 1.1384 |
| 1972 | 1.7288 | 2.1414 | 1.1384 |
| 1973-1974 | 1.7288 | 2.1414 | 1.2170 |
| 1975+ | 1.5909 | 3.9722 | 1.3875 |

* WHERE :

TTCF = Trailer towing correction factor
U = Fraction of VMT towing a trailer
TTC = Correction factor coefficient

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## TABLE 1.2.1A

## EXHAUST EMISSION RATES FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS I (RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Mile) | Deterioration Rate (Gm/Mi/10K Mi) | 50,000 Mile Emission Level (Grams/Mile) |
|---|---|---|---|---|
| HC | Pre-1968 | 7.25 | 0.18 | 8.15 |
| | 1968-1969 | 4.43 | 0.25 | 5.68 |
| | 1970-1971 | 3.00 | 0.37 | 4.85 |
| | 1972-1974 | 3.36 | 0.17 | 4.21 |
| | 1975-1978 | 1.80 | 0.27 | 3.15 |
| | 1979-1980 | 0.92 | 0.27 | 2.27 |
| | 1981-1983 | 0.92 | 0.19 | 1.87 |
| | 1984 | 0.58 | 0.13 | 1.23 |
| | 1985-1986 | 0.45 | 0.07 | 0.80 |
| | 1987+ | 0.51 | 0.06 | 0.81 |
| CO | Pre-1968 | 78.27 | 2.25 | 89.52 |
| | 1968-1969 | 56.34 | 2.55 | 69.09 |
| | 1970-1971 | 42.17 | 3.13 | 57.82 |
| | 1972-1974 | 40.78 | 2.44 | 52.98 |
| | 1975-1978 | 24.55 | 2.59 | 37.50 |
| | 1979-1980 | 13.67 | 2.59 | 26.62 |
| | 1981 | 13.67 | 1.13 | 19.32 |
| | 1982-1983 | 13.67 | 1.13 | 19.32 |
| | 1984 | 7.41 | 0.98 | 12.31 |
| | 1985-1986 | 6.43 | 0.49 | 8.88 |
| | 1987+ | 5.60 | 0.93 | 10.25 |
| NOx | Pre-1968 | 3.44 | 0.0 | 3.44 |
| | 1968-1972 | 4.35 | 0.0 | 4.35 |
| | 1973-1974 | 2.87 | 0.04 | 3.07 |
| | 1975-1978 | 2.70 | 0.03 | 2.85 |
| | 1979-1983 | 1.74 | 0.09 | 2.19 |
| | 1984 | 1.74 | 0.09 | 2.19 |
| | 1985-1986 | 1.74 | 0.04 | 1.94 |
| | 1987+ | 0.86 | 0.04 | 1.06 |

* WHERE : BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

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## TABLE 1.2.1B

### EXHAUST EMISSION RATES FOR
### LOW ALTITUDE
### LIGHT DUTY GASOLINE POWERED TRUCKS I
### AT VARIOUS MILEAGE INTERVALS
### (RATES INCLUDE TAMPERING)

| Pol | Model Years | Emission Rate (Grams/Mile) 0K | 20K | 40K | 60K | 80K | 100K | 120K | 140K |
|---|---|---|---|---|---|---|---|---|---|
| HC | Pre-1968 | 7.25 | 7.61 | 7.97 | 8.33 | 8.69 | 9.05 | 9.40 | 9.76 |
| | 1968-1969 | 4.43 | 4.94 | 5.45 | 5.96 | 6.46 | 6.97 | 7.48 | 7.99 |
| | 1970-1971 | 3.00 | 3.74 | 4.48 | 5.23 | 5.97 | 6.71 | 7.45 | 8.19 |
| | 1972 | 3.37 | 3.71 | 4.06 | 4.41 | 4.75 | 5.10 | 5.44 | 5.79 |
| | 1973-1974 | 3.38 | 3.74 | 4.10 | 4.46 | 4.82 | 5.18 | 5.54 | 5.91 |
| | 1975 | 2.23 | 2.92 | 3.60 | 4.28 | 4.97 | 5.65 | 6.33 | 7.02 |
| | 1976 | 2.29 | 2.99 | 3.69 | 4.39 | 5.09 | 5.79 | 6.49 | 7.19 |
| | 1977-1978 | 2.26 | 2.95 | 3.64 | 4.33 | 5.01 | 5.70 | 6.39 | 7.08 |
| | 1979-1980 | 1.41 | 2.11 | 2.81 | 3.52 | 4.22 | 4.92 | 5.63 | 6.33 |
| | 1981 | 1.51 | 2.08 | 2.64 | 3.21 | 3.78 | 4.35 | 4.91 | 5.48 |
| | 1982 | 1.47 | 2.03 | 2.58 | 3.14 | 3.69 | 4.25 | 4.80 | 5.36 |
| | 1983 | 1.45 | 1.99 | 2.54 | 3.09 | 3.63 | 4.18 | 4.73 | 5.27 |
| | 1984 | 1.08 | 1.48 | 1.88 | 2.29 | 2.69 | 3.09 | 3.50 | 3.90 |
| | 1985-1986 | 0.95 | 1.23 | 1.52 | 1.81 | 2.10 | 2.38 | 2.67 | 2.96 |
| | 1987+ | 0.90 | 1.13 | 1.37 | 1.61 | 1.84 | 2.08 | 2.32 | 2.55 |
| CO | Pre-1968 | 78.26 | 82.72 | 87.17 | 91.63 | 96.09 | 100.55 | 105.01 | 109.47 |
| | 1968-1969 | 56.41 | 61.54 | 66.67 | 71.79 | 76.92 | 82.05 | 87.18 | 92.30 |
| | 1970-1971 | 42.25 | 48.59 | 54.93 | 61.27 | 67.61 | 73.95 | 80.29 | 86.63 |
| | 1972 | 40.93 | 45.99 | 51.05 | 56.11 | 61.17 | 66.23 | 71.29 | 76.34 |
| | 1973-1974 | 41.23 | 46.62 | 52.00 | 57.38 | 62.77 | 68.15 | 73.53 | 78.92 |
| | 1975 | 29.38 | 36.37 | 43.36 | 50.35 | 57.33 | 64.31 | 71.28 | 78.26 |
| | 1976 | 29.92 | 37.06 | 44.19 | 51.33 | 58.46 | 65.58 | 72.70 | 79.83 |
| | 1977-1978 | 29.65 | 36.63 | 43.60 | 50.57 | 57.54 | 64.50 | 71.46 | 78.42 |
| | 1979-1980 | 18.64 | 25.80 | 32.99 | 40.18 | 47.38 | 54.58 | 61.78 | 68.98 |
| | 1981 | 19.46 | 23.76 | 28.06 | 32.36 | 36.65 | 40.94 | 45.23 | 49.52 |
| | 1982 | 19.14 | 23.32 | 27.50 | 31.68 | 35.86 | 40.03 | 44.20 | 48.36 |
| | 1983 | 18.93 | 23.03 | 27.13 | 31.23 | 35.32 | 39.41 | 43.50 | 47.59 |
| | 1984 | 12.07 | 15.62 | 19.19 | 22.76 | 26.32 | 29.89 | 33.46 | 37.03 |
| | 1985-1986 | 11.07 | 13.63 | 16.21 | 18.80 | 21.38 | 23.96 | 26.54 | 29.13 |
| | 1987+ | 9.19 | 12.28 | 15.38 | 18.48 | 21.58 | 24.68 | 27.78 | 30.88 |
| NOx | Pre-1968 | 3.44 | 3.44 | 3.44 | 3.44 | 3.44 | 3.44 | 3.44 | 3.44 |
| | 1968-1972 | 4.35 | 4.35 | 4.35 | 4.34 | 4.34 | 4.34 | 4.34 | 4.34 |
| | 1973 | 2.92 | 3.04 | 3.16 | 3.29 | 3.41 | 3.53 | 3.65 | 3.78 |
| | 1974 | 2.93 | 3.05 | 3.18 | 3.31 | 3.44 | 3.56 | 3.69 | 3.82 |
| | 1975-1978 | 2.86 | 3.03 | 3.20 | 3.38 | 3.55 | 3.73 | 3.90 | 4.08 |
| | 1979-1980 | 1.92 | 2.24 | 2.57 | 2.90 | 3.23 | 3.55 | 3.88 | 4.21 |
| | 1981 | 1.92 | 2.24 | 2.57 | 2.90 | 3.22 | 3.55 | 3.88 | 4.21 |
| | 1982 | 1.92 | 2.25 | 2.58 | 2.91 | 3.24 | 3.56 | 3.89 | 4.22 |
| | 1983 | 1.93 | 2.26 | 2.59 | 2.93 | 3.26 | 3.59 | 3.92 | 4.25 |
| | 1984 | 1.95 | 2.28 | 2.62 | 2.95 | 3.29 | 3.62 | 3.95 | 4.29 |
| | 1985-1986 | 1.95 | 2.18 | 2.42 | 2.65 | 2.89 | 3.12 | 3.36 | 3.60 |
| | 1987+ | 1.19 | 1.39 | 1.59 | 1.80 | 2.00 | 2.20 | 2.41 | 2.61 |

DATE : MAY 25, 1985

## TABLE 1.2.1C

## CRANKCASE AND EVAPORATIVE HYDROCARBON EMISSIONS FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS I (RATES REFLECT ZERO TAMPERING)

** CCEV = (HSK * TPD + DNL)/MPD + CC

| Model Years | SHED Hot Soak Emissions (Gm/Trip) | Trips* Per Day | SHED Diurnal Emissions (Gm/Day) | Miles* Per Day | Crankcase Emissions (Gm/Mile) | Total Crankcase and Evap. Emissions (Gm/Mile) |
|---|---|---|---|---|---|---|
| Pre-1963 | 22.45 | 3.05 | 47.99 | 26.30 | 4.10 | 8.53 |
| 1963-1967 | 22.45 | 3.05 | 47.99 | 26.30 | 0.80 | 5.23 |
| 1968-1970 | 22.45 | 3.05 | 47.99 | 26.30 | 0.0 | 4.43 |
| 1971 | 16.15 | 3.05 | 38.58 | 26.30 | 0.0 | 3.34 |
| 1972-1977 | 12.32 | 3.05 | 23.53 | 26.30 | 0.0 | 2.32 |
| 1978-1983 | 3.98 | 3.05 | 9.31 | 26.30 | 0.0 | 0.82 |
| 1984 | 3.59 | 3.05 | 9.31 | 26.30 | 0.0 | 0.77 |
| 1985 | 3.20 | 3.05 | 9.31 | 26.30 | 0.0 | 0.73 |
| 1986 | 2.81 | 3.05 | 9.31 | 26.30 | 0.0 | 0.68 |
| 1987 | 2.47 | 3.05 | 9.31 | 26.30 | 0.0 | 0.64 |
| 1988-1989 | 2.05 | 3.05 | 9.31 | 26.30 | 0.0 | 0.59 |
| 1990+ | 1.82 | 3.05 | 9.31 | 26.30 | 0.0 | 0.57 |

* Default information that may be altered by the MOBILE3 user with information about the local area.

** WHERE :

CCEV = Total untampered crankcase & evaporative HC emissions (Gm/Mile)
HSK = Hot soak emissions (Gm/Trip)
TPD = Trips per day
DNL = Diurnal emissions (Gm/Day)
MPD = Miles per day
CC = Crankcase emissions (Gm/Mile)

DATE : MAY 25, 1985

## TABLE 1.2.1D

## TOTAL CRANKCASE AND EVAPORATIVE HC EMISSIONS
## FOR LOW ALTITUDE
## LIGHT DUTY GASOLINE POWERED TRUCKS I
## AT VARIOUS MILEAGE INTERVALS
## (RATES INCLUDE TAMPERING)

| Model Years | Emission Rate (Grams/Mile) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 0K | 20K | 40K | 60K | 80K | 100K | 120K | 140K |
| Pre-1963 | 8.53 | 8.53 | 8.53 | 8.53 | 8.53 | 8.53 | 8.53 | 8.53 |
| 1963-1967 | 5.23 | 5.23 | 5.23 | 5.23 | 5.23 | 5.23 | 5.23 | 5.23 |
| 1968-1970 | 4.54 | 4.56 | 4.58 | 4.60 | 4.62 | 4.64 | 4.65 | 4.67 |
| 1971 | 3.50 | 3.53 | 3.55 | 3.58 | 3.61 | 3.63 | 3.66 | 3.69 |
| 1972-1974 | 2.53 | 2.57 | 2.60 | 2.64 | 2.67 | 2.71 | 2.74 | 2.78 |
| 1975-1977 | 2.53 | 2.56 | 2.60 | 2.63 | 2.67 | 2.70 | 2.74 | 2.77 |
| 1978-1979 | 0.99 | 1.02 | 1.04 | 1.07 | 1.10 | 1.13 | 1.16 | 1.19 |
| 1980 | 0.97 | 1.00 | 1.03 | 1.05 | 1.08 | 1.11 | 1.13 | 1.16 |
| 1981-1982 | 0.97 | 1.00 | 1.02 | 1.05 | 1.08 | 1.10 | 1.13 | 1.16 |
| 1983 | 0.97 | 0.99 | 1.02 | 1.04 | 1.07 | 1.09 | 1.12 | 1.14 |
| 1984 | 0.91 | 0.94 | 0.96 | 0.98 | 1.01 | 1.03 | 1.05 | 1.08 |
| 1985 | 0.86 | 0.88 | 0.90 | 0.92 | 0.95 | 0.97 | 0.99 | 1.01 |
| 1986 | 0.80 | 0.82 | 0.84 | 0.86 | 0.88 | 0.90 | 0.93 | 0.95 |
| 1987 | 0.75 | 0.77 | 0.79 | 0.81 | 0.83 | 0.85 | 0.87 | 0.89 |
| 1988-1989 | 0.70 | 0.71 | 0.73 | 0.75 | 0.76 | 0.78 | 0.80 | 0.82 |
| 1990+ | 0.66 | 0.68 | 0.70 | 0.71 | 0.73 | 0.75 | 0.76 | 0.78 |

DATE : MAY 25, 1985

## TABLE 1.2.2A

DATE : MAY 25, 1985

### EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
### LIGHT DUTY GASOLINE POWERED TRUCKS I
### TOTAL HC (INCLUDES EVAP & CRANKCASE)

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 961 | 19.1 | 1962 | 19.1 | 1963 | 15.8 | 1964 | 15.8 | 1965 | 15.8 | 1966 | 15.8 | 1967 | 15.8 | 1968 | 13.7 | 1969 | 13.7 | 1970 | 14.6 | 1971 | 13.5 | 1972 | 9.3 |
| 962 | 19.0 | 1963 | 15.7 | 1964 | 15.7 | 1965 | 15.7 | 1966 | 15.7 | 1967 | 15.7 | 1968 | 13.6 | 1969 | 13.6 | 1970 | 14.4 | 1971 | 13.3 | 1972 | 9.2 | 1973 | 9.2 |
| 1963 | 15.6 | 1964 | 15.6 | 1965 | 15.6 | 1966 | 15.6 | 1967 | 15.6 | 1968 | 13.5 | 1969 | 13.5 | 1970 | 14.2 | 1971 | 13.1 | 1972 | 9.1 | 1973 | 9.1 | 1974 | 9.1 |
| 1964 | 15.5 | 1965 | 15.5 | 1966 | 15.5 | 1967 | 15.5 | 1968 | 13.3 | 1969 | 13.3 | 1970 | 14.0 | 1971 | 12.9 | 1972 | 9.0 | 1973 | 9.0 | 1974 | 9.0 | 1975 | 9.1 |
| 1965 | 15.4 | 1966 | 15.4 | 1967 | 15.4 | 1968 | 13.2 | 1969 | 13.2 | 1970 | 13.8 | 1971 | 12.7 | 1972 | 8.9 | 1973 | 8.9 | 1974 | 8.9 | 1975 | 9.0 | 1976 | 9.0 |
| 1966 | 15.3 | 1967 | 15.3 | 1968 | 13.0 | 1969 | 13.0 | 1970 | 13.6 | 1971 | 12.5 | 1972 | 8.8 | 1973 | 8.8 | 1974 | 8.8 | 1975 | 8.8 | 1976 | 8.8 | 1977 | 8.8 |
| 1967 | 15.2 | 1968 | 12.9 | 1969 | 12.9 | 1970 | 13.3 | 1971 | 12.2 | 1972 | 8.7 | 1973 | 8.7 | 1974 | 8.7 | 1975 | 8.6 | 1976 | 8.6 | 1977 | 8.6 | 1978 | 7.1 |
| 1968 | 12.7 | 1969 | 12.7 | 1970 | 13.1 | 1971 | 12.0 | 1972 | 8.6 | 1973 | 8.6 | 1974 | 8.6 | 1975 | 8.4 | 1976 | 8.4 | 1977 | 8.4 | 1978 | 6.9 | 1979 | 6.0 |
| 1969 | 12.5 | 1970 | 12.8 | 1971 | 11.7 | 1972 | 8.5 | 1973 | 8.5 | 1974 | 8.5 | 1975 | 8.2 | 1976 | 8.2 | 1977 | 8.2 | 1978 | 6.7 | 1979 | 5.8 | 1980 | 5.8 |
| 1970 | 12.5 | 1971 | 11.4 | 1972 | 8.3 | 1973 | 8.3 | 1974 | 8.3 | 1975 | 8.0 | 1976 | 8.0 | 1977 | 8.0 | 1978 | 6.5 | 1979 | 5.6 | 1980 | 5.6 | 1981 | 4.6 |
| 1971 | 11.0 | 1972 | 8.2 | 1973 | 8.2 | 1974 | 8.2 | 1975 | 7.8 | 1976 | 7.8 | 1977 | 7.8 | 1978 | 6.2 | 1979 | 5.4 | 1980 | 5.4 | 1981 | 4.4 | 1982 | 4.4 |
| 1972 | 8.0 | 1973 | 8.0 | 1974 | 8.0 | 1975 | 7.5 | 1976 | 7.5 | 1977 | 7.5 | 1978 | 6.0 | 1979 | 5.1 | 1980 | 5.1 | 1981 | 4.2 | 1982 | 4.2 | 1983 | 4.2 |
| 1973 | 7.8 | 1974 | 7.8 | 1975 | 7.2 | 1976 | 7.2 | 1977 | 7.2 | 1978 | 5.7 | 1979 | 4.8 | 1980 | 4.8 | 1981 | 4.0 | 1982 | 4.0 | 1983 | 4.0 | 1984 | 3.0 |
| 1974 | 7.6 | 1975 | 6.9 | 1976 | 6.9 | 1977 | 6.9 | 1978 | 5.4 | 1979 | 4.5 | 1980 | 4.5 | 1981 | 3.8 | 1982 | 3.8 | 1983 | 3.8 | 1984 | 2.9 | 1985 | 2.2 |
| 1975 | 6.6 | 1976 | 6.6 | 1977 | 6.6 | 1978 | 5.1 | 1979 | 4.2 | 1980 | 4.2 | 1981 | 3.6 | 1982 | 3.6 | 1983 | 3.6 | 1984 | 2.7 | 1985 | 2.1 | 1986 | 2.1 |
| 1976 | 6.2 | 1977 | 6.2 | 1978 | 4.7 | 1979 | 3.8 | 1980 | 3.8 | 1981 | 3.3 | 1982 | 3.3 | 1983 | 3.3 | 1984 | 2.6 | 1985 | 2.0 | 1986 | 2.0 | 1987 | 1.9 |
| 1977 | 5.8 | 1978 | 4.3 | 1979 | 3.4 | 1980 | 3.4 | 1981 | 3.1 | 1982 | 3.1 | 1983 | 3.1 | 1984 | 2.4 | 1985 | 1.9 | 1986 | 1.9 | 1987 | 1.8 | 1988 | 1.7 |
| 1978 | 3.9 | 1979 | 3.0 | 1980 | 3.0 | 1981 | 2.8 | 1982 | 2.8 | 1983 | 2.8 | 1984 | 2.2 | 1985 | 1.8 | 1986 | 1.8 | 1987 | 1.7 | 1988 | 1.6 | 1989 | 1.6 |
| 1979 | 2.6 | 1980 | 2.6 | 1981 | 2.4 | 1982 | 2.4 | 1983 | 2.4 | 1984 | 2.0 | 1985 | 1.7 | 1986 | 1.7 | 1987 | 1.6 | 1988 | 1.5 | 1989 | 1.5 | 1990 | 1.5 |
| 1980 | 2.3 | 1981 | 2.2 | 1982 | 2.2 | 1983 | 2.2 | 1984 | 1.8 | 1985 | 1.6 | 1986 | 1.6 | 1987 | 1.5 | 1988 | 1.5 | 1989 | 1.5 | 1990 | 1.4 | 1991 | 1.4 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 9.3 | 1974 | 9.3 | 1975 | 9.5 | 1976 | 9.5 | 1977 | 9.5 | 1978 | 8.0 | 1979 | 7.1 | 1980 | 7.1 | 1981 | 5.7 | 1982 | 5.7 | 1983 | 5.7 | 1984 | 4.2 |
| 1974 | 9.2 | 1975 | 9.4 | 1976 | 9.4 | 1977 | 9.4 | 1978 | 7.9 | 1979 | 7.0 | 1980 | 7.0 | 1981 | 5.6 | 1982 | 5.6 | 1983 | 5.6 | 1984 | 4.1 | 1985 | 2.9 |
| 1975 | 9.3 | 1976 | 9.3 | 1977 | 9.3 | 1978 | 7.8 | 1979 | 6.9 | 1980 | 6.9 | 1981 | 5.5 | 1982 | 5.5 | 1983 | 5.5 | 1984 | 4.0 | 1985 | 2.8 | 1986 | 2.8 |
| 1976 | 9.1 | 1977 | 9.1 | 1978 | 7.6 | 1979 | 6.7 | 1980 | 6.7 | 1981 | 5.4 | 1982 | 5.4 | 1983 | 5.4 | 1984 | 4.0 | 1985 | 2.8 | 1986 | 2.7 | 1987 | 2.5 |
| 1977 | 9.0 | 1978 | 7.5 | 1979 | 6.6 | 1980 | 6.6 | 1981 | 5.3 | 1982 | 5.3 | 1983 | 5.3 | 1984 | 3.9 | 1985 | 2.7 | 1986 | 2.7 | 1987 | 2.5 | 1988 | 2.4 |
| 1978 | 7.3 | 1979 | 6.4 | 1980 | 6.4 | 1981 | 5.2 | 1982 | 5.2 | 1983 | 5.2 | 1984 | 3.8 | 1985 | 2.7 | 1986 | 2.7 | 1987 | 2.4 | 1988 | 2.4 | 1989 | 2.4 |
| 1979 | 6.2 | 1980 | 6.2 | 1981 | 5.0 | 1982 | 5.0 | 1983 | 5.0 | 1984 | 3.7 | 1985 | 2.7 | 1986 | 2.6 | 1987 | 2.4 | 1988 | 2.3 | 1989 | 2.3 | 1990 | 2.3 |
| 1980 | 6.0 | 1981 | 4.9 | 1982 | 4.9 | 1983 | 4.9 | 1984 | 3.6 | 1985 | 2.6 | 1986 | 2.6 | 1987 | 2.4 | 1988 | 2.3 | 1989 | 2.3 | 1990 | 2.3 | 1991 | 2.3 |
| 1981 | 4.7 | 1982 | 4.7 | 1983 | 4.7 | 1984 | 3.5 | 1985 | 2.5 | 1986 | 2.5 | 1987 | 2.3 | 1988 | 2.3 | 1989 | 2.3 | 1990 | 2.2 | 1991 | 2.2 | 1992 | 2.2 |
| 1982 | 4.6 | 1983 | 4.6 | 1984 | 3.4 | 1985 | 2.5 | 1986 | 2.4 | 1987 | 2.3 | 1988 | 2.2 | 1989 | 2.2 | 1990 | 2.2 | 1991 | 2.2 | 1992 | 2.2 | 1993 | 2.2 |
| 1983 | 4.4 | 1984 | 3.3 | 1985 | 2.4 | 1986 | 2.4 | 1987 | 2.2 | 1988 | 2.2 | 1989 | 2.2 | 1990 | 2.1 | 1991 | 2.1 | 1992 | 2.1 | 1993 | 2.1 | 1994 | 2.1 |
| 1984 | 3.2 | 1985 | 2.4 | 1986 | 2.3 | 1987 | 2.1 | 1988 | 2.1 | 1989 | 2.1 | 1990 | 2.1 | 1991 | 2.1 | 1992 | 2.1 | 1993 | 2.1 | 1994 | 2.1 | 1995 | 2.1 |
| 1985 | 2.3 | 1986 | 2.2 | 1987 | 2.1 | 1988 | 2.0 | 1989 | 2.0 | 1990 | 2.0 | 1991 | 2.0 | 1992 | 2.0 | 1993 | 2.0 | 1994 | 2.0 | 1995 | 2.0 | 1996 | 2.0 |
| 1986 | 2.2 | 1987 | 2.0 | 1988 | 2.0 | 1989 | 2.0 | 1990 | 1.9 | 1991 | 1.9 | 1992 | 1.9 | 1993 | 1.9 | 1994 | 1.9 | 1995 | 1.9 | 1996 | 1.9 | 1997 | 1.9 |
| 1987 | 1.9 | 1988 | 1.9 | 1989 | 1.9 | 1990 | 1.9 | 1991 | 1.9 | 1992 | 1.9 | 1993 | 1.9 | 1994 | 1.9 | 1995 | 1.9 | 1996 | 1.9 | 1997 | 1.9 | 1998 | 1.9 |
| 1988 | 1.8 | 1989 | 1.8 | 1990 | 1.8 | 1991 | 1.8 | 1992 | 1.8 | 1993 | 1.8 | 1994 | 1.8 | 1995 | 1.8 | 1996 | 1.8 | 1997 | 1.8 | 1998 | 1.8 | 1999 | 1.8 |
| 1989 | 1.7 | 1990 | 1.7 | 1991 | 1.7 | 1992 | 1.7 | 1993 | 1.7 | 1994 | 1.7 | 1995 | 1.7 | 1996 | 1.7 | 1997 | 1.7 | 1998 | 1.7 | 1999 | 1.7 | 2000 | 1.7 |
| 1990 | 1.6 | 1991 | 1.6 | 1992 | 1.6 | 1993 | 1.6 | 1994 | 1.6 | 1995 | 1.6 | 1996 | 1.6 | 1997 | 1.6 | 1998 | 1.6 | 1999 | 1.6 | 2000 | 1.6 | 2001 | 1.6 |
| 1991 | 1.5 | 1992 | 1.5 | 1993 | 1.5 | 1994 | 1.5 | 1995 | 1.5 | 1996 | 1.5 | 1997 | 1.5 | 1998 | 1.5 | 1999 | 1.5 | 2000 | 1.5 | 2001 | 1.5 | 2002 | 1.5 |
| 1992 | 1.4 | 1993 | 1.4 | 1994 | 1.4 | 1995 | 1.4 | 1996 | 1.4 | 1997 | 1.4 | 1998 | 1.4 | 1999 | 1.4 | 2000 | 1.4 | 2001 | 1.4 | 2002 | 1.4 | 2003 | 1.4 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.2.4.

## TABLE 1.2.2B

### EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
### LIGHT DUTY GASOLINE POWERED TRUCKS I
### CO

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 118.5 | 1962 | 118.5 | 1963 | 118.5 | 1964 | 118.5 | 1965 | 118.5 | 1966 | 118.5 | 1967 | 118.5 | 1968 | 102.1 | 1969 | 102.1 | 1970 | 98.4 | 1971 | 98.4 | 1972 | 84.6 |
| 1962 | 117.5 | 1963 | 117.5 | 1964 | 117.5 | 1965 | 117.5 | 1966 | 117.5 | 1967 | 117.5 | 1968 | 100.9 | 1969 | 100.9 | 1970 | 97.0 | 1971 | 97.0 | 1972 | 83.5 | 1973 | 83.5 |
| 1963 | 116.4 | 1964 | 116.4 | 1965 | 116.4 | 1966 | 116.4 | 1967 | 116.4 | 1968 | 99.7 | 1969 | 99.7 | 1970 | 95.5 | 1971 | 95.5 | 1972 | 82.3 | 1973 | 82.3 | 1974 | 82.3 |
| 1964 | 115.2 | 1965 | 115.2 | 1966 | 115.2 | 1967 | 115.2 | 1968 | 98.3 | 1969 | 98.3 | 1970 | 93.8 | 1971 | 93.8 | 1972 | 81.0 | 1973 | 81.0 | 1974 | 81.0 | 1975 | 67.3 |
| 1965 | 113.9 | 1966 | 113.9 | 1967 | 113.9 | 1968 | 96.9 | 1969 | 96.9 | 1970 | 92.0 | 1971 | 92.0 | 1972 | 79.6 | 1973 | 79.6 | 1974 | 79.6 | 1975 | 65.9 | 1976 | 65.9 |
| 1966 | 112.5 | 1967 | 112.5 | 1968 | 95.3 | 1969 | 95.3 | 1970 | 90.1 | 1971 | 90.1 | 1972 | 78.1 | 1973 | 78.1 | 1974 | 78.1 | 1975 | 64.3 | 1976 | 64.3 | 1977 | 64.3 |
| 1967 | 111.0 | 1968 | 93.6 | 1969 | 93.6 | 1970 | 88.0 | 1971 | 88.0 | 1972 | 76.5 | 1973 | 76.5 | 1974 | 76.5 | 1975 | 62.6 | 1976 | 62.6 | 1977 | 62.6 | 1978 | 62.6 |
| 1968 | 91.8 | 1969 | 91.8 | 1970 | 85.8 | 1971 | 85.8 | 1972 | 74.8 | 1973 | 74.8 | 1974 | 74.8 | 1975 | 60.7 | 1976 | 60.7 | 1977 | 60.7 | 1978 | 60.7 | 1979 | 49.9 |
| 1969 | 89.8 | 1970 | 83.4 | 1971 | 83.4 | 1972 | 72.9 | 1973 | 72.9 | 1974 | 72.9 | 1975 | 58.7 | 1976 | 58.7 | 1977 | 58.7 | 1978 | 58.7 | 1979 | 47.9 | 1980 | 47.9 |
| 1970 | 80.8 | 1971 | 80.8 | 1972 | 70.8 | 1973 | 70.8 | 1974 | 70.8 | 1975 | 56.6 | 1976 | 56.6 | 1977 | 56.6 | 1978 | 56.6 | 1979 | 45.7 | 1980 | 45.7 | 1981 | 27.6 |
| 1971 | 78.0 | 1972 | 68.7 | 1973 | 68.7 | 1974 | 68.7 | 1975 | 54.2 | 1976 | 54.2 | 1977 | 54.2 | 1978 | 54.2 | 1979 | 43.4 | 1980 | 43.4 | 1981 | 26.6 | 1982 | 26.6 |
| 1972 | 66.3 | 1973 | 66.3 | 1974 | 66.3 | 1975 | 51.7 | 1976 | 51.7 | 1977 | 51.7 | 1978 | 51.7 | 1979 | 40.9 | 1980 | 40.9 | 1981 | 25.5 | 1982 | 25.5 | 1983 | 25.5 |
| 1973 | 63.8 | 1974 | 63.8 | 1975 | 49.0 | 1976 | 49.0 | 1977 | 49.0 | 1978 | 49.0 | 1979 | 38.2 | 1980 | 38.2 | 1981 | 24.3 | 1982 | 24.3 | 1983 | 24.3 | 1984 | 16.7 |
| 1974 | 61.0 | 1975 | 46.1 | 1976 | 46.1 | 1977 | 46.1 | 1978 | 46.1 | 1979 | 35.3 | 1980 | 35.3 | 1981 | 23.1 | 1982 | 23.1 | 1983 | 23.1 | 1984 | 15.6 | 1985 | 10.5 |
| 1975 | 43.0 | 1976 | 43.0 | 1977 | 43.0 | 1978 | 43.0 | 1979 | 32.2 | 1980 | 32.2 | 1981 | 21.7 | 1982 | 21.7 | 1983 | 21.7 | 1984 | 14.4 | 1985 | 9.9 | 1986 | 9.9 |
| 1976 | 39.6 | 1977 | 39.6 | 1978 | 39.6 | 1979 | 28.8 | 1980 | 28.8 | 1981 | 20.2 | 1982 | 20.2 | 1983 | 20.2 | 1984 | 13.1 | 1985 | 9.3 | 1986 | 9.3 | 1987 | 11.0 |
| 1977 | 36.0 | 1978 | 36.0 | 1979 | 25.1 | 1980 | 25.1 | 1981 | 18.6 | 1982 | 18.6 | 1983 | 18.6 | 1984 | 11.7 | 1985 | 8.6 | 1986 | 8.6 | 1987 | 9.7 | 1988 | 9.7 |
| 1978 | 32.0. | 1979 | 21.2 | 1980 | 21.2 | 1981 | 16.9 | 1982 | 16.9 | 1983 | 16.9 | 1984 | 10.2 | 1985 | 7.8 | 1986 | 7.8 | 1987 | 8.3 | 1988 | 8.3 | 1989 | 8.3 |
| 1979 | 17.0 | 1980 | 17.0 | 1981 | 15.1 | 1982 | 15.1 | 1983 | 15.1 | 1984 | 8.6 | 1985 | 7.0 | 1986 | 7.0 | 1987 | 6.8 | 1988 | 6.8 | 1989 | 6.8 | 1990 | 6.8 |
| 1980 | 14.2 | 1981 | 13.8 | 1982 | 13.8 | 1983 | 13.8 | 1984 | 7.6 | 1985 | 6.5 | 1986 | 6.5 | 1987 | 5.8 | 1988 | 5.8 | 1989 | 5.8 | 1990 | 5.8 | 1991 | 5.8 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 84.6 | 1974 | 84.6 | 1975 | 71.2 | 1976 | 71.2 | 1977 | 71.2 | 1978 | 71.2 | 1979 | 60.3 | 1980 | 60.3 | 1981 | 34.0 | 1982 | 34.0 | 1983 | 34.0 | 1984 | 25.1 |
| 1974 | 83.5 | 1975 | 70.0 | 1976 | 70.0 | 1977 | 70.0 | 1978 | 70.0 | 1979 | 59.2 | 1980 | 59.2 | 1981 | 33.5 | 1982 | 33.5 | 1983 | 33.5 | 1984 | 24.6 | 1985 | 15. |
| 1975 | 68.7 | 1976 | 68.7 | 1977 | 68.7 | 1978 | 68.7 | 1979 | 57.9 | 1980 | 57.9 | 1981 | 32.9 | 1982 | 32.9 | 1983 | 32.9 | 1984 | 24.1 | 1985 | 14.8 | 1986 | 14 |
| 1976 | 67.3 | 1977 | 67.3 | 1978 | 67.3 | 1979 | 56.5 | 1980 | 56.5 | 1981 | 32.3 | 1982 | 32.3 | 1983 | 32.3 | 1984 | 23.6 | 1985 | 14.5 | 1986 | 14.5 | 1987 | 21. |
| 1977 | 65.9 | 1978 | 65.9 | 1979 | 55.0 | 1980 | 55.0 | 1981 | 31.7 | 1982 | 31.7 | 1983 | 31.7 | 1984 | 23.1 | 1985 | 14.2 | 1986 | 14.2 | 1987 | 20.5 | 1988 | 20. |
| 1978 | 64.3 | 1979 | 53.4 | 1980 | 53.4 | 1981 | 31.0 | 1982 | 31.0 | 1983 | 31.0 | 1984 | 22.4 | 1985 | 13.9 | 1986 | 13.9 | 1987 | 19.9 | 1988 | 19.9 | 1989 | 19.9 |
| 1979 | 51.7 | 1980 | 51.7 | 1981 | 30.2 | 1982 | 30.2 | 1983 | 30.2 | 1984 | 21.8 | 1985 | 13.6 | 1986 | 13.6 | 1987 | 19.3 | 1988 | 19.3 | 1989 | 19.3 | 1990 | 19.3 |
| 1980 | 49.9 | 1981 | 29.4 | 1982 | 29.4 | 1983 | 29.4 | 1984 | 21.1 | 1985 | 13.3 | 1986 | 13.3 | 1987 | 18.6 | 1988 | 18.6 | 1989 | 18.6 | 1990 | 18.6 | 1991 | 18.6 |
| 1981 | 28.6 | 1982 | 28.6 | 1983 | 28.6 | 1984 | 20.3 | 1985 | 12.9 | 1986 | 12.9 | 1987 | 17.9 | 1988 | 17.9 | 1989 | 17.9 | 1990 | 17.9 | 1991 | 17.9 | 1992 | 17.9 |
| 1982 | 27.6 | 1983 | 27.6 | 1984 | 19.5 | 1985 | 12.5 | 1986 | 12.5 | 1987 | 17.1 | 1988 | 17.1 | 1989 | 17.1 | 1990 | 17.1 | 1991 | 17.1 | 1992 | 17.1 | 1993 | 17.1 |
| 1983 | 26.6 | 1984 | 18.7 | 1985 | 12.0 | 1986 | 12.0 | 1987 | 16.3 | 1988 | 16.3 | 1989 | 16.3 | 1990 | 16.3 | 1991 | 16.3 | 1992 | 16.3 | 1993 | 16.3 | 1994 | 16.3 |
| 1984 | 17.7 | 1985 | 11.6 | 1986 | 11.6 | 1987 | 15.4 | 1988 | 15.4 | 1989 | 15.4 | 1990 | 15.4 | 1991 | 15.4 | 1992 | 15.4 | 1993 | 15.4 | 1994 | 15.4 | 1995 | 15.4 |
| 1985 | 11.1 | 1986 | 11.1 | 1987 | 14.4 | 1988 | 14.4 | 1989 | 14.4 | 1990 | 14.4 | 1991 | 14.4 | 1992 | 14.4 | 1993 | 14.4 | 1994 | 14.4 | 1995 | 14.4 | 1996 | 14.4 |
| 1986 | 10.5 | 1987 | 13.4 | 1988 | 13.4 | 1989 | 13.4 | 1990 | 13.4 | 1991 | 13.4 | 1992 | 13.4 | 1993 | 13.4 | 1994 | 13.4 | 1995 | 13.4 | 1996 | 13.4 | 1997 | 13.4 |
| 1987 | 12.2 | 1988 | 12.2 | 1989 | 12.2 | 1990 | 12.2 | 1991 | 12.2 | 1992 | 12.2 | 1993 | 12.2 | 1994 | 12.2 | 1995 | 12.2 | 1996 | 12.2 | 1997 | 12.2 | 1998 | 12.2 |
| 1988 | 11.0 | 1989 | 11.0 | 1990 | 11.0 | 1991 | 11.0 | 1992 | 11.0 | 1993 | 11.0 | 1994 | 11.0 | 1995 | 11.0 | 1996 | 11.0 | 1997 | 11.0 | 1998 | 11.0 | 1999 | 11.0 |
| 1989 | 9.7 | 1990 | 9.7 | 1991 | 9.7 | 1992 | 9.7 | 1993 | 9.7 | 1994 | 9.7 | 1995 | 9.7 | 1996 | 9.7 | 1997 | 9.7 | 1998 | 9.7 | 1999 | 9.7 | 2000 | 9.7 |
| 1990 | 8.3 | 1991 | 8.3 | 1992 | 8.3 | 1993 | 8.3 | 1994 | 8.3 | 1995 | 8.3 | 1996 | 8.3 | 1997 | 8.3 | 1998 | 8.3 | 1999 | 8.3 | 2000 | 8.3 | 2001 | 8.3 |
| 1991 | 6.8 | 1992 | 6.8 | 1993 | 6.8 | 1994 | 6.8 | 1995 | 6.8 | 1996 | 6.8 | 1997 | 6.8 | 1998 | 6.8 | 1999 | 6.8 | 2000 | 6.8 | 2001 | 6.8 | 2002 | 6.8 |
| 1992 | 5.8 | 1993 | 5.8 | 1994 | 5.8 | 1995 | 5.8 | 1996 | 5.8 | 1997 | 5.8 | 1998 | 5.8 | 1999 | 5.8 | 2000 | 5.8 | 2001 | 5.8 | 2002 | 5.8 | 2003 | 5.8 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.2.4.

## TABLE 1.2.2C

DATE : MAY 25, 1985

### EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
### LIGHT DUTY GASOLINE POWERED TRUCKS I
### NOx

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 3.4 | 1962 | 3.4 | 1963 | 3.4 | 1964 | 3.4 | 1965 | 3.4 | 1966 | 3.4 | 1967 | 3.4 | 1968 | 4.3 | 1969 | 4.3 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 |
| 1962 | 3.4 | 1963 | 3.4 | 1964 | 3.4 | 1965 | 3.4 | 1966 | 3.4 | 1967 | 3.4 | 1968 | 4.3 | 1969 | 4.3 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 3.6 |
| 1963 | 3.4 | 1964 | 3.4 | 1965 | 3.4 | 1966 | 3.4 | 1967 | 3.4 | 1968 | 4.3 | 1969 | 4.3 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 3.5 | 1974 | 3.5 |
| 1964 | 3.4 | 1965 | 3.4 | 1966 | 3.4 | 1967 | 3.4 | 1968 | 4.3 | 1969 | 4.3 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 3.5 | 1974 | 3.5 | 1975 | 3.2 |
| 1965 | 3.4 | 1966 | 3.4 | 1967 | 3.4 | 1968 | 4.3 | 1969 | 4.3 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 3.5 | 1974 | 3.5 | 1975 | 3.2 | 1976 | 3.2 |
| 1966 | 3.4 | 1967 | 3.4 | 1968 | 4.3 | 1969 | 4.3 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 3.5 | 1974 | 3.5 | 1975 | 3.2 | 1976 | 3.2 | 1977 | 3.2 |
| 1967 | 3.4 | 1968 | 4.3 | 1969 | 4.3 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 3.4 | 1974 | 3.4 | 1975 | 3.1 | 1976 | 3.1 | 1977 | 3.1 | 1978 | 3.1 |
| 1968 | 4.3 | 1969 | 4.3 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 3.4 | 1974 | 3.4 | 1975 | 3.1 | 1976 | 3.1 | 1977 | 3.1 | 1978 | 3.1 | 1979 | 3.0 |
| 1969 | 4.3 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 3.4 | 1974 | 3.4 | 1975 | 3.1 | 1976 | 3.1 | 1977 | 3.1 | 1978 | 3.1 | 1979 | 2.9 | 1980 | 2.9 |
| 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 3.4 | 1974 | 3.4 | 1975 | 3.1 | 1976 | 3.1 | 1977 | 3.1 | 1978 | 3.1 | 1979 | 2.8 | 1980 | 2.8 | 1981 | 2.8 |
| 1971 | 4.3 | 1972 | 4.3 | 1973 | 3.3 | 1974 | 3.3 | 1975 | 3.0 | 1976 | 3.0 | 1977 | 3.0 | 1978 | 3.0 | 1979 | 2.8 | 1980 | 2.8 | 1981 | 2.8 | 1982 | 2.8 |
| 1972 | 4.3 | 1973 | 3.3 | 1974 | 3.3 | 1975 | 3.0 | 1976 | 3.0 | 1977 | 3.0 | 1978 | 3.0 | 1979 | 2.7 | 1980 | 2.7 | 1981 | 2.7 | 1982 | 2.7 | 1983 | 2.7 |
| 1973 | 3.2 | 1974 | 3.2 | 1975 | 3.0 | 1976 | 3.0 | 1977 | 3.0 | 1978 | 3.0 | 1979 | 2.6 | 1980 | 2.6 | 1981 | 2.6 | 1982 | 2.6 | 1983 | 2.6 | 1984 | 2.6 |
| 1974 | 3.2 | 1975 | 2.9 | 1976 | 2.9 | 1977 | 2.9 | 1978 | 2.9 | 1979 | 2.5 | 1980 | 2.5 | 1981 | 2.5 | 1982 | 2.5 | 1983 | 2.5 | 1984 | 2.5 | 1985 | 2.1 |
| 1975 | 2.9 | 1976 | 2.9 | 1977 | 2.9 | 1978 | 2.9 | 1979 | 2.4 | 1980 | 2.4 | 1981 | 2.4 | 1982 | 2.4 | 1983 | 2.4 | 1984 | 2.4 | 1985 | 2.0 | 1986 | 2.0 |
| 1976 | 2.9 | 1977 | 2.9 | 1978 | 2.9 | 1979 | 2.3 | 1980 | 2.3 | 1981 | 2.3 | 1982 | 2.3 | 1983 | 2.3 | 1984 | 2.3 | 1985 | 2.0 | 1986 | 2.0 | 1987 | 1.1 |
| 1977 | 2.8 | 1978 | 2.8 | 1979 | 2.1 | 1980 | 2.1 | 1981 | 2.1 | 1982 | 2.1 | 1983 | 2.1 | 1984 | 2.1 | 1985 | 1.9 | 1986 | 1.9 | 1987 | 1.0 | 1988 | 1.0 |
| 1978 | 2.8 | 1979 | 2.0 | 1980 | 2.0 | 1981 | 2.0 | 1982 | 2.0 | 1983 | 2.0 | 1984 | 2.0 | 1985 | 1.9 | 1986 | 1.9 | 1987 | 1.0 | 1988 | 1.0 | 1989 | 1.0 |
| 1979 | 1.8 | 1980 | 1.8 | 1981 | 1.8 | 1982 | 1.8 | 1983 | 1.8 | 1984 | 1.8 | 1985 | 1.8 | 1986 | 1.8 | 1987 | 0.9 | 1988 | 0.9 | 1989 | 0.9 | 1990 | 0.9 |
| 1980 | 1.8 | 1981 | 1.8 | 1982 | 1.8 | 1983 | 1.8 | 1984 | 1.8 | 1985 | 1.7 | 1986 | 1.7 | 1987 | 0.9 | 1988 | 0.9 | 1989 | 0.9 | 1990 | 0.9 | 1991 | 0.9 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 3.6 | 1974 | 3.6 | 1975 | 3.2 | 1976 | 3.2 | 1977 | 3.2 | 1978 | 3.2 | 1979 | 3.4 | 1980 | 3.4 | 1981 | 3.4 | 1982 | 3.4 | 1983 | 3.4 | 1984 | 3.4 |
| 1974 | 3.6 | 1975 | 3.2 | 1976 | 3.2 | 1977 | 3.2 | 1978 | 3.2 | 1979 | 3.3 | 1980 | 3.3 | 1981 | 3.3 | 1982 | 3.3 | 1983 | 3.3 | 1984 | 3.3 | 1985 | 2.4 |
| 1975 | 3.2 | 1976 | 3.2 | 1977 | 3.2 | 1978 | 3.2 | 1979 | 3.3 | 1980 | 3.3 | 1981 | 3.3 | 1982 | 3.3 | 1983 | 3.3 | 1984 | 3.3 | 1985 | 2.4 | 1986 | 2.4 |
| 1976 | 3.2 | 1977 | 3.2 | 1978 | 3.2 | 1979 | 3.2 | 1980 | 3.2 | 1981 | 3.2 | 1982 | 3.2 | 1983 | 3.2 | 1984 | 3.2 | 1985 | 2.4 | 1986 | 2.4 | 1987 | 1.5 |
| 1977 | 3.2 | 1978 | 3.2 | 1979 | 3.2 | 1980 | 3.2 | 1981 | 3.2 | 1982 | 3.2 | 1983 | 3.2 | 1984 | 3.2 | 1985 | 2.4 | 1986 | 2.4 | 1987 | 1.5 | 1988 | 1.5 |
| 1978 | 3.2 | 1979 | 3.1 | 1980 | 3.1 | 1981 | 3.1 | 1982 | 3.1 | 1983 | 3.1 | 1984 | 3.1 | 1985 | 2.3 | 1986 | 2.3 | 1987 | 1.5 | 1988 | 1.5 | 1989 | 1.5 |
| 1979 | 3.1 | 1980 | 3.1 | 1981 | 3.1 | 1982 | 3.1 | 1983 | 3.1 | 1984 | 3.1 | 1985 | 2.3 | 1986 | 2.3 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 |
| 1980 | 3.0 | 1981 | 3.0 | 1982 | 3.0 | 1983 | 3.0 | 1984 | 3.0 | 1985 | 2.3 | 1986 | 2.3 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 | 1991 | 1.4 |
| 1981 | 2.9 | 1982 | 2.9 | 1983 | 2.9 | 1984 | 2.9 | 1985 | 2.3 | 1986 | 2.3 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 | 1991 | 1.4 | 1992 | 1.4 |
| 1982 | 2.8 | 1983 | 2.8 | 1984 | 2.8 | 1985 | 2.2 | 1986 | 2.2 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 | 1991 | 1.4 | 1992 | 1.4 | 1993 | 1.4 |
| 1983 | 2.8 | 1984 | 2.8 | 1985 | 2.2 | 1986 | 2.2 | 1987 | 1.3 | 1988 | 1.3 | 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 | 1993 | 1.3 | 1994 | 1.3 |
| 1984 | 2.7 | 1985 | 2.2 | 1986 | 2.2 | 1987 | 1.3 | 1988 | 1.3 | 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 | 1993 | 1.3 | 1994 | 1.3 | 1995 | 1.3 |
| 1985 | 2.1 | 1986 | 2.1 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 | 1991 | 1.2 | 1992 | 1.2 | 1993 | 1.2 | 1994 | 1.2 | 1995 | 1.2 | 1996 | 1.2 |
| 1986 | 2.1 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 | 1991 | 1.2 | 1992 | 1.2 | 1993 | 1.2 | 1994 | 1.2 | 1995 | 1.2 | 1996 | 1.2 | 1997 | 1.2 |
| 1987 | 1.1 | 1988 | 1.1 | 1989 | 1.1 | 1990 | 1.1 | 1991 | 1.1 | 1992 | 1.1 | 1993 | 1.1 | 1994 | 1.1 | 1995 | 1.1 | 1996 | 1.1 | 1997 | 1.1 | 1998 | 1.1 |
| 1988 | 1.1 | 1989 | 1.1 | 1990 | 1.1 | 1991 | 1.1 | 1992 | 1.1 | 1993 | 1.1 | 1994 | 1.1 | 1995 | 1.1 | 1996 | 1.1 | 1997 | 1.1 | 1998 | 1.1 | 1999 | 1.1 |
| 1989 | 1.0 | 1990 | 1.0 | 1991 | 1.0 | 1992 | 1.0 | 1993 | 1.0 | 1994 | 1.0 | 1995 | 1.0 | 1996 | 1.0 | 1997 | 1.0 | 1998 | 1.0 | 1999 | 1.0 | 2000 | 1.0 |
| 1990 | 1.0 | 1991 | 1.0 | 1992 | 1.0 | 1993 | 1.0 | 1994 | 1.0 | 1995 | 1.0 | 1996 | 1.0 | 1997 | 1.0 | 1998 | 1.0 | 1999 | 1.0 | 2000 | 1.0 | 2001 | 1.0 |
| 1991 | 0.9 | 1992 | 0.9 | 1993 | 0.9 | 1994 | 0.9 | 1995 | 0.9 | 1996 | 0.9 | 1997 | 0.9 | 1998 | 0.9 | 1999 | 0.9 | 2000 | 0.9 | 2001 | 0.9 | 2002 | 0.9 |
| 1992 | 0.9 | 1993 | 0.9 | 1994 | 0.9 | 1995 | 0.9 | 1996 | 0.9 | 1997 | 0.9 | 1998 | 0.9 | 1999 | 0.9 | 2000 | 0.9 | 2001 | 0.9 | 2002 | 0.9 | 2003 | 0.9 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.2.4.

TABLE 1.2.3

IDLE EMISSION RATES FOR
LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS I

* IER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Min.) | Deterioration Rate (Gm/Min/10K Mi) |
|---|---|---|---|
| HC | Pre-1968 | 1.32 | 0.03 |
| | 1968-1969 | 1.07 | 0.06 |
| | 1970-1971 | 0.54 | 0.07 |
| | 1972-1974 | 0.72 | 0.04 |
| | 1975-1978 | 0.37 | 0.06 |
| | 1979-1980 | 0.07 | 0.02 |
| | 1981-1983 | 0.06 | 0.02 |
| | 1984 | 0.04 | 0.02 |
| | 1985-1986 | 0.03 | 0.01 |
| | 1987+ | 0.03 | 0.01 |
| CO | Pre-1968 | 13.76 | 0.40 |
| | 1968-1969 | 13.99 | 0.63 |
| | 1970-1971 | 11.84 | 0.88 |
| | 1972-1974 | 12.66 | 0.76 |
| | 1975-1978 | 6.27 | 0.72 |
| | 1979-1980 | 1.57 | 0.32 |
| | 1981 | 1.31 | 0.27 |
| | 1982-1983 | 1.19 | 0.24 |
| | 1984 | 0.69 | 0.14 |
| | 1985-1986 | 0.34 | 0.18 |
| | 1987+ | 0.34 | 0.18 |
| NOx | Pre-1968 | 0.09 | 0.0 |
| | 1968-1972 | 0.17 | 0.0 |
| | 1973-1974 | 0.14 | 0.0 |
| | 1975-1978 | 0.06 | 0.0 |
| | 1979-1983 | 0.06 | 0.0 |
| | 1984 | 0.05 | 0.0 |
| | 1985-1986 | 0.02 | 0.0 |
| | 1987+ | 0.02 | 0.0 |

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10.000

DATE : MAY 25, 1985

## TABLE 1.2.4

## REGISTRATION MIX AND
## MILEAGE ACCUMULATION RATES FOR
## LOW ALTITUDE
## LIGHT DUTY GASOLINE POWERED TRUCKS I

| Model Year Index** | July 1 Registration Mix* | Mileage Accumulation Rate per truck * | Jan 1 Registration Mix | Jan 1 Mileage Accumulation Rate (fleet) | Jan 1 Mileage Accumulation (fleet) |
|---|---|---|---|---|---|
| 1 | 0.067 | 17394. | 0.022 | 17394. | 2174. |
| 2 | 0.085 | 16132. | 0.085 | 17078. | 13006. |
| 3 | 0.081 | 14961. | 0.081 | 15839. | 29456. |
| 4 | 0.077 | 13876. | 0.077 | 14690. | 44713. |
| 5 | 0.073 | 12869. | 0.073 | 13624. | 58862. |
| 6 | 0.069 | 11935. | 0.069 | 12635. | 71986. |
| 7 | 0.065 | 11069. | 0.065 | 11718. | 84156. |
| 8 | 0.061 | 10266. | 0.061 | 10868. | 95444. |
| 9 | 0.057 | 9521. | 0.057 | 10080. | 105912. |
| 10 | 0.053 | 8830. | 0.053 | 9348. | 115621. |
| 11 | 0.048 | 8189. | 0.048 | 8670. | 124625. |
| 12 | 0.044 | 7595. | 0.044 | 8040. | 132976. |
| 13 | 0.040 | 7044. | 0.040 | 7457. | 140720. |
| 14 | 0.036 | 6533. | 0.036 | 6916. | 147903. |
| 15 | 0.032 | 6059. | 0.032 | 6414. | 154565. |
| 16 | 0.028 | 5619. | 0.028 | 5949. | 160744. |
| 17 | 0.024 | 5211. | 0.024 | 5517. | 166474. |
| 18 | 0.020 | 4833. | 0.020 | 5116. | 171787. |
| 19 | 0.016 | 4483. | 0.016 | 4745. | 176716. |
| 20+ | 0.024 | 4157. | 0.024 | 4401. | 181287. |

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

DATE : MAY 25, 1985

TABLE 1.2.5

### EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS I JANUARY 1, 1988

| Model Years | (A) LDTI Fleet Registration | (B) Sales Fraction | (A*B) | (C=A*B/DAF) LDGTI Registration | (D) Annual Mileage Accrual Rate | (C*D) | (C*D/TFNORM) Travel Fractions |
|---|---|---|---|---|---|---|---|
| 1988 | 0.022 | 0.760 | 0.017 | 0.019 | 17394. | 337.1 | 0.031 |
| 1987 | 0.085 | 0.790 | 0.067 | 0.077 | 17078. | 1309.6 | 0.120 |
| 1986 | 0.081 | 0.820 | 0.066 | 0.076 | 15839. | 1201.4 | 0.110 |
| 1985 | 0.077 | 0.840 | 0.065 | 0.074 | 14690. | 1085.0 | 0.099 |
| 1984 | 0.073 | 0.870 | 0.064 | 0.073 | 13624. | 988.1 | 0.091 |
| 1983 | 0.069 | 0.900 | 0.062 | 0.071 | 12635. | 896.0 | 0.082 |
| 1982 | 0.065 | 0.920 | 0.060 | 0.068 | 11718. | 800.2 | 0.073 |
| 1981 | 0.061 | 0.940 | 0.057 | 0.065 | 10868. | 711.6 | 0.065 |
| 1980 | 0.057 | 0.966 | 0.055 | 0.063 | 10080. | 633.8 | 0.058 |
| 1979 | 0.053 | 0.972 | 0.052 | 0.059 | 9348. | 549.9 | 0.050 |
| 1978 | 0.048 | 0.991 | 0.048 | 0.054 | 8670. | 470.9 | 0.043 |
| 1977 | 0.044 | 0.995 | 0.044 | 0.050 | 8040. | 402.0 | 0.037 |
| 1976 | 0.040 | 0.997 | 0.040 | 0.046 | 7457. | 339.6 | 0.031 |
| 1975 | 0.036 | 0.998 | 0.036 | 0.041 | 6916. | 283.8 | 0.026 |
| 1974 | 0.032 | 1.000 | 0.032 | 0.037 | 6414. | 234.4 | 0.021 |
| 1973 | 0.028 | 1.000 | 0.028 | 0.032 | 5949. | 190.2 | 0.017 |
| 1972 | 0.024 | 1.000 | 0.024 | 0.027 | 5517. | 151.2 | 0.014 |
| 1971 | 0.020 | 1.000 | 0.020 | 0.023 | 5116. | 116.9 | 0.011 |
| 1970 | 0.016 | 1.000 | 0.016 | 0.018 | 4745. | 86.7 | 0.008 |
| 1969- | 0.024 | 1.000 | 0.024 | 0.027 | 4401. | 120.6 | 0.011 |
|  |  | DAF: | 0.876 |  | TFNORM: | 10909.0 |  |

WHERE :

A = January 1 registration mix from Table 1.2.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 1.2.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI) = .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

NOTE : In general, the travel weighting fractions will change for every calendar year since the sales fraction (column B) changes for almost every model year.

DATE : MAY 25, 1985

## TABLE 1.2.6

## SPEED CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS I

* SCF(s,sadj) = SF(s)/SF(sadj)

$SF(s) = EXP(A + B*s + C*s^2 + D*S^3 + E*s^4 + F*s^5)$, HC & CO
$= A + B*s + C*s^2 + D*s^3 + E*s^4 + F*s^5$ , NOx,Pre-1979
$= EXP(A + B*s + C*s^2 + D*s^3 + E*s^4 + F*s^5)$, NOx,1979+

| Pollutant and Model Years | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| HC | | | | | | |
| Pre-1968 | 0.231026E+01 | -0.289572E+00 | 0.152990E-01 | -0.446689E-03 | 0.648183E-05 | -0.363456E-07 |
| 1968 | 0.239726E+01 | -0.299985E+00 | 0.161351E-01 | -0.487491E-03 | 0.729093E-05 | -0.419769E-07 |
| 1969 | 0.240873E+01 | -0.308187E+00 | 0.168168E-01 | -0.506843E-03 | 0.753855E-05 | -0.431596E-07 |
| 1970 | 0.223217E+01 | -0.284985E+00 | 0.153833E-01 | -0.456738E-03 | 0.673486E-05 | -0.383798E-07 |
| 1971 | 0.225223E+01 | -0.287778E+00 | 0.156820E-01 | -0.473179E-03 | 0.707954E-05 | -0.408456E-07 |
| 1972 | 0.234948E+01 | -0.304959E+00 | 0.168416E-01 | -0.509623E-03 | 0.759516E-05 | -0.434963E-07 |
| 1973-1974 | 0.268382E+01 | -0.344633E+00 | 0.195417E-01 | -0.625720E-03 | 0.978442E-05 | -0.583369E-07 |
| 1975-1978 | 0.239540E+01 | -0.335781E+00 | 0.211609E-01 | -0.731550E-03 | 0.120715E-04 | -0.748566E-07 |
| 1979-1983 | 0.121545E+01 | -0.707633E-01 | 0.446460E-03 | 0.0 | 0.0 | 0.0 |
| 1984-1986 | 0.144386E+01 | -0.880857E-01 | 0.735680E-03 | 0.0 | 0.0 | 0.0 |
| 1987+ | 0.984090E+00 | -0.567319E-01 | 0.332820E-03 | 0.0 | 0.0 | 0.0 |
| CO | | | | | | |
| Pre-1968 | 0.233989E+01 | -0.296978E+00 | 0.160071E-01 | -0.477396E-03 | 0.706752E-05 | -0.403978E-07 |
| 1968 | 0.246551E+01 | -0.305023E+00 | 0.160497E-01 | -0.473969E-03 | 0.699075E-05 | -0.399758E-07 |
| 1969 | 0.277804E+01 | -0.319130E+00 | 0.153183E-01 | -0.422327E-03 | 0.584948E-05 | -0.314969E-07 |
| 1970 | 0.278899E+01 | -0.327107E+00 | 0.162943E-01 | -0.467573E-03 | 0.671906E-05 | -0.374401E-07 |
| 1971 | 0.270743E+01 | -0.331038E+00 | 0.176179E-01 | -0.538583E-03 | 0.817402E-05 | -0.477803E-07 |
| 1972 | 0.268454E+01 | -0.332817E+00 | 0.176277E-01 | -0.524123E-03 | 0.772221E-05 | -0.437025E-07 |
| 1973-1974 | 0.283929E+01 | -0.368756E+00 | 0.210782E-01 | -0.676438E-03 | 0.106267E-04 | -0.636405E-07 |
| 1975-1978 | 0.248747E+01 | -0.391562E+00 | 0.270721E-01 | -0.976178E-03 | 0.165270E-04 | -0.104317E-06 |
| 1979-1983 | 0.116177E+01 | -0.592737E-01 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1984-1986 | 0.881952E+00 | -0.449976E-01 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1987+ | 0.858419E+00 | -0.437969E-01 | 0.0 | 0.0 | 0.0 | 0.0 |
| NOx | | | | | | |
| Pre-1968 | 0.168635E+01 | -0.118303E+00 | 0.654975E-02 | -0.137139E-03 | 0.100849E-05 | 0.0 |
| 1968 | 0.122677E+01 | -0.444978E-01 | 0.262476E-02 | -0.567150E-04 | 0.434293E-06 | 0.0 |
| 1969 | 0.101743E+01 | -0.118958E-01 | 0.914365E-03 | -0.215740E-04 | 0.182300E-06 | 0.0 |
| 1970 | 0.987600E+00 | -0.195674E-01 | 0.169645E-02 | -0.404000E-04 | 0.328001E-06 | 0.0 |
| 1971 | 0.115917E+01 | -0.444536E-01 | 0.296425E-02 | -0.668990E-04 | 0.522365E-06 | 0.0 |
| 1972 | 0.128169E+01 | -0.804874E-01 | 0.535735E-02 | -0.118891E-03 | 0.901060E-06 | 0.0 |
| 1973-1974 | 0.783838E+00 | 0.328549E-03 | 0.106029E-02 | -0.319350E-04 | 0.290389E-06 | 0.0 |
| 1975-1978 | 0.942131E+00 | -0.423240E-01 | 0.386253E-02 | -0.939853E-04 | 0.753883E-06 | 0.0 |
| 1979-1983 | 0.308282E+00 | -0.230362E-01 | 0.372830E-03 | 0.0 | 0.0 | 0.0 |
| 1984-1986 | 0.295046E+00 | -0.236333E-01 | 0.437750E-03 | 0.0 | 0.0 | 0.0 |
| 1987+ | 0.386041E+00 | -0.262961E-01 | 0.336740E-03 | 0.0 | 0.0 | 0.0 |

* **WHERE** : s = average speed (mph)
sadj = basic test procedure speed; adjusted for fraction of cold start operation x and fraction of hot start operation w, [ 1/sadj = (w+x)/26 + (1-w-x)/16 ]

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## TABLE 1.2.7A

## TEMPERATURE CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS I

* TCF(b) = EXP( TC(b) * (T - 75.0))

| | | Test segment 1 | | Test segment 2 | | Test segment 3 | |
|---|---|---|---|---|---|---|---|
| Pol | Model Years | TC Low | TC High | TC Low | TC High | TC Low | TC High |
| HC | Pre-1968 | -0.20623E-01 | -0.14381E-01 | -0.24032E-02 | 0.13219E-02 | -0.10081E-02 | 0.34799E-02 |
| | 1968-1969 | -0.24462E-01 | -0.12552E-01 | -0.32017E-02 | 0.42667E-02 | -0.86884E-03 | 0.75843E-02 |
| | 1970-1971 | -0.21255E-01 | -0.10888E-01 | -0.52755E-03 | -0.47925E-03 | 0.93659E-03 | 0.76666E-02 |
| | 1972-1974 | -0.21427E-01 | -0.66107E-02 | -0.39442E-03 | 0.26288E-02 | 0.49731E-02 | 0.12320E-01 |
| | 1975-1983 | -0.23517E-01 | -0.14095E-01 | -0.88057E-02 | 0.26179E-01 | -0.16222E-02 | 0.24297E-01 |
| | 1984-1986 | -0.27793E-01 | -0.14095E-01 | -0.10177E-01 | 0.26179E-01 | -0.82680E-02 | 0.24297E-01 |
| | 1987+ | -0.33883E-01 | 0.11959E-01 | -0.10113E-01 | -0.12627E-04 | -0.80650E-02 | 0.78765E-02 |
| CO | Pre-1968 | -0.13487E-01 | -0.14691E-01 | 0.15784E-02 | 0.37462E-02 | 0.11097E-02 | 0.11014E-01 |
| | 1968-1969 | -0.21126E-01 | -0.38767E-01 | -0.15289E-02 | 0.84685E-02 | 0.15749E-02 | 0.25179E-01 |
| | 1970-1971 | -0.20843E-01 | -0.21165E-01 | -0.59951E-02 | 0.23603E-01 | 0.18253E-02 | 0.28483E-01 |
| | 1972-1974 | -0.19091E-01 | -0.13146E-01 | -0.42373E-03 | 0.24717E-01 | 0.57982E-02 | 0.25848E-01 |
| | 1975-1983 | -0.24835E-01 | -0.19612E-01 | -0.88336E-02 | 0.48537E-01 | -0.11553E-02 | 0.31439E-01 |
| | 1984-1986 | see NOTE 2 | -0.19612E-01 | -0.17783E-01 | 0.48537E-01 | -0.10871E-01 | 0.31439E-01 |
| | 1987+ | see NOTE 2 | -0.12596E-01 | -0.18813E-01 | 0.13861E-01 | -0.11951E-01 | 0.96939E-02 |
| NOx | Pre-1968 | -0.16897E-03 | 0.38841E-02 | -0.89245E-02 | -0.87325E-02 | -0.72580E-02 | -0.10839E-01 |
| | 1968-1972 | -0.25074E-03 | -0.10389E-02 | -0.59791E-02 | -0.92466E-02 | -0.62690E-02 | -0.10108E-01 |
| | 1973-1974 | 0.38855E-02 | -0.18301E-01 | -0.24156E-02 | -0.10925E-01 | -0.21188E-02 | -0.18042E-01 |
| | 1975-1978 | -0.45504E-04 | -0.71420E-02 | -0.12575E-02 | -0.87910E-02 | -0.53153E-03 | -0.75470E-02 |
| | 1979-1986 | -0.76044E-02 | -0.26153E-01 | -0.68045E-02 | -0.18603E-01 | -0.54198E-02 | -0.20878E-01 |
| | 1987+ | -0.53710E-02 | -0.34416E-01 | -0.65050E-02 | -0.35871E-01 | -0.85650E-02 | -0.28830E-01 |

* WHERE :

TCF(b) = Temperature correction factor for appropriate pollutant, ambient temperature, and model year; for test segment b
T = Ambient temperature (Fahrenheit)
TC(b) = Temperature correction factor coefficient for appropriate pollutant, reference temperature and model year; for test segment b
75.0 = Reference temperature

NOTE 1 : The temperature correction factor is used in conjunction with the Ripstwxn correction factor given in Table 1.2.7B.

NOTE 2 : Offset model used for Bag 1 CO. Offset = -1.3812*(T - 75.0).

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## TABLE 1.2.7B

## NORMALIZED BAG FRACTIONS FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS I

| | | Normalized Fractions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Model | Test Seg.#1 | | Test Seg.#2 | | Test Seg.#3 | | Total Test | |
| Pol | Years | B1 | D1 | B2 | D2 | B3 | D3 | B0 | D0 |
| HC | Pre-1968 | 1.282 | 0.025 | 0.973 | 0.028 | 0.839 | 0.019 | 1.000 | 0.025 |
| | 1968-1969 | 1.345 | 0.074 | 0.946 | 0.054 | 0.842 | 0.048 | 1.000 | 0.056 |
| | 1970-1971 | 1.345 | 0.178 | 0.919 | 0.118 | 0.894 | 0.093 | 1.000 | 0.124 |
| | 1972-1974 | 1.398 | 0.060 | 0.885 | 0.055 | 0.919 | 0.036 | 1.000 | 0.051 |
| | 1975-1983 | 1.860 | 0.345 | 0.766 | 0.234 | 0.804 | 0.196 | 1.000 | 0.243 |
| | 1984-1986 | 2.200 | 0.714 | 0.571 | 0.171 | 0.914 | 0.143 | 1.000 | 0.286 |
| | 1987+ | 2.634 | 1.104 | 0.368 | 0.499 | 0.973 | 0.391 | 1.000 | 0.594 |
| CO | Pre-1968 | 1.277 | 0.033 | 1.017 | 0.029 | 0.758 | 0.025 | 1.000 | 0.029 |
| | 1968-1969 | 1.442 | 0.071 | 0.996 | 0.042 | 0.674 | 0.033 | 1.000 | 0.046 |
| | 1970-1971 | 1.553 | 0.109 | 0.933 | 0.079 | 0.711 | 0.038 | 1.000 | 0.074 |
| | 1972-1974 | 1.573 | 0.054 | 0.902 | 0.079 | 0.755 | 0.029 | 1.000 | 0.060 |
| | 1975-1983 | 1.972 | 0.176 | 0.881 | 0.157 | 0.628 | 0.109 | 1.000 | 0.139 |
| | 1984-1986 | 2.438 | 0.282 | 0.658 | 0.062 | 0.621 | 0.077 | 1.000 | 0.111 |
| | 1987+ | 3.941 | 2.009 | 0.0 | 1.186 | 0.689 | 1.014 | 1.000 | 1.308 |
| NOx | Pre-1968 | 1.121 | 0.009 | 0.785 | 0.001 | 1.319 | -0.009 | 1.000 | 0.0 |
| | 1968-1972 | 1.199 | -0.004 | 0.793 | -0.002 | 1.245 | 0.006 | 1.000 | 0.0 |
| | 1973-1974 | 1.262 | 0.022 | 0.770 | 0.004 | 1.242 | 0.027 | 1.000 | 0.014 |
| | 1975-1978 | 1.299 | 0.012 | 0.783 | 0.004 | 1.197 | 0.016 | 1.000 | 0.012 |
| | 1979-1986 | 1.372 | 0.040 | 0.766 | 0.046 | 1.167 | 0.063 | 1.000 | 0.051 |
| | 1987+ | 1.830 | 0.169 | 0.703 | 0.149 | 0.939 | 0.222 | 1.000 | 0.173 |

NOTE : The fractions given in this table are used in the calculation of the operating-mode/ temperature correction factor (OMTCF).

WHERE : OMTCF = ((TERM1 + TERM2 + TERM3)/DENOM)
TERM1 = W *TCF(1)*(B1+D1*M)
TERM2 = (1-W-X)*TCF(2)*(B2+D2*M)
TERM3 = X *TCF(3)*(B3+D3*M)
DENOM = B0 + D0*M
W = Fraction of VMT in the cold start mode
X = Fraction of VMT in the hot start mode
TCF(b) = Temperature correction factor for pollutant, model year; for test segment b
M = Cumulative mileage / 10,000

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## TABLE 1.2.8A

## AIR CONDITIONING CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS I

* ACCF= U*V*(A + B*(T-75) -1) + 1

| Model Years | HC | | CO | | NOx | |
|---|---|---|---|---|---|---|
| | A | B | A | B | A | B |
| Pre-1975 | 0.1023E+01 | 0.3344E-02 | 0.1202E+01 | 0.1808E-02 | 0.1299E+01 | 0.5643E-04 |
| 1975+ | 0.1000E+01 | 0.3512E-02 | 0.1130E+01 | 0.1528E-02 | 0.1221E+01 | 0.4262E-03 |

* WHERE :

ACCF = Air Conditioning Correction Factor
V = Fraction of vehicles which are equipped with AC given in Table 1.2.8B
U = Fraction of vehicles with AC that are using it = (DI-DILO)/(DIHI-DI), 0<=U<=1
DI = Discomfort index = (DB+WB)*.4+15
DILO = The highest discomfort index where no AC is used
DIHI = The lowest discomfort index where all vehicles with AC use it
DB = Dry bulb temperature (Fahrenheit)
WB = Wet bulb temperature (Fahrenheit)
T = Ambient temperature (Fahrenheit)

## TABLE 1.2.8B

## ESTIMATED FRACTION OF LOW ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS I EQUIPPED WITH AIR CONDITIONING

| Model Years | Fraction Equipped With Air Conditioning |
|---|---|
| Pre-1977 | 0.32 |
| 1977 | 0.52 |
| 1978+ | 0.39 |

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## TABLE 1.2.9

## EXTRA LOAD CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS I

* XLCF = (XLC-1)*U + 1

| Model Years | Coefficients (XLC) HC | CO | NOx |
|---|---|---|---|
| Pre-1968 | 1.0786 | 1.2765 | 0.9535 |
| 1968-1969 | 1.0495 | 1.1384 | 1.0313 |
| 1970-1971 | 1.0852 | 1.2478 | 1.0313 |
| 1972 | 1.0556 | 1.1347 | 1.0313 |
| 1973-1974 | 1.0556 | 1.1347 | 1.0753 |
| 1975+ | 1.0455 | 1.3058 | 1.0719 |

* WHERE :

XLCF = Extra load correction factor
U = Fraction of VMT with an extra load
XLC = Correction factor coefficient

## TABLE 1.2.10

## TRAILER TOWING CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS I

* TTCF = (TTC-1)*U + 1

| Model Years | Coefficients (TTC) HC | CO | NOx |
|---|---|---|---|
| Pre-1968 | 1.2614 | 1.9327 | 1.1184 |
| 1968-1969 | 1.2762 | 1.8940 | 1.1384 |
| 1970-1971 | 1.4598 | 2.4753 | 1.1384 |
| 1972 | 1.7288 | 2.1414 | 1.1384 |
| 1973-1974 | 1.7288 | 2.1414 | 1.2170 |
| 1975+ | 1.5909 | 3.9722 | 1.3875 |

* WHERE :

TTCF = Trailer towing correction factor
U = Fraction of VMT towing a trailer
TTC = Correction factor coefficient

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## TABLE 1.3.1A

## EXHAUST EMISSION RATES FOR
## LOW ALTITUDE
## LIGHT DUTY GASOLINE POWERED TRUCKS II
## (RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Mile) | Deterioration Rate (Gm/Mi/10K Mi) | 50,000 Mile Emission Level (Grams/Mile) |
|---|---|---|---|---|
| HC | Pre-1970 | 9.57 | 0.18 | 10.47 |
| | 1970-1973 | 6.28 | 0.25 | 7.53 |
| | 1974-1978 | 6.28 | 0.17 | 7.13 |
| | 1979-1980 | 0.92 | 0.27 | 2.27 |
| | 1981-1983 | 0.92 | 0.19 | 1.87 |
| | 1984 | 0.58 | 0.13 | 1.23 |
| | 1985-1986 | 0.45 | 0.07 | 0.80 |
| | 1987+ | 0.51 | 0.06 | 0.81 |
| CO | Pre-1970 | 93.98 | 2.25 | 105.23 |
| | 1970-1973 | 60.08 | 2.55 | 72.83 |
| | 1974-1978 | 60.08 | 2.44 | 72.28 |
| | 1979-1980 | 13.67 | 2.59 | 26.62 |
| | 1981 | 13.67 | 1.13 | 19.32 |
| | 1982-1983 | 13.67 | 1.13 | 19.32 |
| | 1984 | 7.41 | 0.98 | 12.31 |
| | 1985-1986 | 6.43 | 0.49 | 8.88 |
| | 1987+ | 5.60 | 0.91 | 10.15 |
| NOx | Pre-1970 | 5.44 | 0.0 | 5.44 |
| | 1970-1973 | 6.45 | 0.0 | 6.45 |
| | 1974-1978 | 4.61 | 0.04 | 4.81 |
| | 1979-1983 | 1.74 | 0.09 | 2.19 |
| | 1984 | 1.74 | 0.09 | 2.19 |
| | 1985-1986 | 1.74 | 0.04 | 1.94 |
| | 1987+ | 0.86 | 0.04 | 1.06 |

* WHERE : BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

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## TABLE 1.3.1B

## EXHAUST EMISSION RATES FOR
## LOW ALTITUDE
## LIGHT DUTY GASOLINE POWERED TRUCKS II
## AT VARIOUS MILEAGE INTERVALS
## (RATES INCLUDE TAMPERING)

| Pol | Model Years | Emission Rate (Grams/Mile)<br>0K | 20K | 40K | 60K | 80K | 100K | 120K | 140K |
|---|---|---|---|---|---|---|---|---|---|
| HC | Pre-1970 | 9.57 | 9.93 | 10.29 | 10.65 | 11.01 | 11.36 | 11.72 | 12.08 |
| | 1970-1973 | 6.28 | 6.78 | 7.29 | 7.80 | 8.30 | 8.81 | 9.31 | 9.82 |
| | 1974-1978 | 6.28 | 6.62 | 6.96 | 7.29 | 7.63 | 7.97 | 8.31 | 8.65 |
| | 1979-1980 | 1.52 | 2.26 | 2.99 | 3.72 | 4.45 | 5.19 | 5.92 | 6.65 |
| | 1981-1982 | 1.52 | 2.09 | 2.67 | 3.24 | 3.81 | 4.38 | 4.95 | 5.52 |
| | 1983 | 1.50 | 2.06 | 2.62 | 3.19 | 3.75 | 4.31 | 4.88 | 5.44 |
| | 1984 | 1.08 | 1.48 | 1.88 | 2.29 | 2.69 | 3.09 | 3.50 | 3.90 |
| | 1985-1986 | 0.95 | 1.23 | 1.52 | 1.81 | 2.10 | 2.38 | 2.67 | 2.96 |
| | 1987+ | 0.90 | 1.13 | 1.37 | 1.61 | 1.84 | 2.08 | 2.32 | 2.55 |
| CO | Pre-1970 | 93.97 | 98.42 | 102.87 | 107.32 | 111.77 | 116.22 | 120.68 | 125.13 |
| | 1970-1973 | 60.08 | 65.12 | 70.16 | 75.21 | 80.25 | 85.30 | 90.34 | 95.38 |
| | 1974-1978 | 60.09 | 64.99 | 69.89 | 74.79 | 79.69 | 84.59 | 89.49 | 94.39 |
| | 1979-1980 | 19.57 | 26.95 | 34.36 | 41.77 | 49.19 | 56.61 | 64.03 | 71.46 |
| | 1981-1982 | 19.57 | 23.90 | 28.25 | 32.58 | 36.92 | 41.25 | 45.58 | 49.91 |
| | 1983 | 19.36 | 23.61 | 27.88 | 32.13 | 36.39 | 40.64 | 44.89 | 49.14 |
| | 1984 | 12.07 | 15.62 | 19.19 | 22.76 | 26.32 | 29.89 | 33.46 | 37.03 |
| | 1985-1986 | 11.07 | 13.63 | 16.21 | 18.80 | 21.38 | 23.96 | 26.54 | 29.13 |
| | 1987+ | 9.19 | 12.24 | 15.30 | 18.36 | 21.42 | 24.48 | 27.54 | 30.60 |
| NOx | Pre-1970 | 5.44 | 5.44 | 5.44 | 5.44 | 5.44 | 5.44 | 5.43 | 5.43 |
| | 1970-1972 | 6.45 | 6.45 | 6.44 | 6.44 | 6.44 | 6.44 | 6.43 | 6.43 |
| | 1973 | 6.47 | 6.48 | 6.49 | 6.51 | 6.52 | 6.53 | 6.55 | 6.56 |
| | 1974-1978 | 4.63 | 4.72 | 4.82 | 4.92 | 5.01 | 5.11 | 5.20 | 5.30 |
| | 1979-1982 | 1.92 | 2.24 | 2.57 | 2.90 | 3.23 | 3.55 | 3.88 | 4.21 |
| | 1983 | 1.92 | 2.24 | 2.57 | 2.90 | 3.23 | 3.55 | 3.88 | 4.21 |
| | 1984 | 1.95 | 2.28 | 2.62 | 2.95 | 3.29 | 3.62 | 3.95 | 4.29 |
| | 1985-1986 | 1.95 | 2.18 | 2.42 | 2.65 | 2.89 | 3.12 | 3.36 | 3.60 |
| | 1987+ | 1.19 | 1.39 | 1.59 | 1.80 | 2.00 | 2.20 | 2.41 | 2.61 |

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## TABLE 1.3.1C

## CRANKCASE AND EVAPORATIVE HYDROCARBON EMISSIONS FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS II (RATES REFLECT ZERO TAMPERING)

** CCEV = (HSK * TPD + DNL)/MPD + CC

| Model Years | SHED Hot Soak Emissions (Gm/Trip) | Trips* Per Day | SHED Diurnal Emissions (Gm/Day) | Miles* Per Day | Crankcase Emissions (Gm/Mile) | Total Crankcase and Evap. Emissions (Gm/Mile) |
|---|---|---|---|---|---|---|
| Pre-1968 | 27.66 | 3.05 | 77.89 | 33.70 | 5.70 | 10.51 |
| 1968-1978 | 27.66 | 3.05 | 77.89 | 33.70 | 0.0 | 4.81 |
| 1979-1983 | 3.98 | 3.05 | 9.31 | 33.70 | 0.0 | 0.64 |
| 1984 | 3.59 | 3.05 | 9.31 | 33.70 | 0.0 | 0.60 |
| 1985 | 3.20 | 3.05 | 9.31 | 33.70 | 0.0 | 0.57 |
| 1986 | 2.81 | 3.05 | 9.31 | 33.70 | 0.0 | 0.53 |
| 1987 | 2.47 | 3.05 | 9.31 | 33.70 | 0.0 | 0.50 |
| 1988-1989 | 2.05 | 3.05 | 9.31 | 33.70 | 0.0 | 0.46 |
| 1990+ | 1.82 | 3.05 | 9.31 | 33.70 | 0.0 | 0.44 |

* Default information that may be altered by the MOBILE3 user with information about the local area.

** WHERE :

CCEV = Total untampered crankcase & evaporative HC emissions (Gm/Mile)
HSK = Hot soak emissions (Gm/Trip)
TPD = Trips per day
DNL = Diurnal emissions (Gm/Day)
MPD = Miles per day
CC = Crankcase emissions (Gm/Mile)

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## TABLE 1.3.1D

## TOTAL CRANKCASE AND EVAPORATIVE HC EMISSIONS FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS II AT VARIOUS MILEAGE INTERVALS (RATES INCLUDE TAMPERING)

| Model Years | Emission Rate (Grams/Mile) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 0K | 20K | 40K | 60K | 80K | 100K | 120K | 140K |
| Pre-1968 | 10.51 | 10.51 | 10.51 | 10.51 | 10.51 | 10.51 | 10.51 | 10.51 |
| 1968-1970 | 4.97 | 5.00 | 5.03 | 5.05 | 5.08 | 5.10 | 5.13 | 5.16 |
| 1971-1974 | 4.96 | 4.99 | 5.01 | 5.04 | 5.06 | 5.09 | 5.11 | 5.13 |
| 1975-1977 | 4.96 | 4.99 | 5.01 | 5.03 | 5.06 | 5.08 | 5.10 | 5.13 |
| 1978 | 4.96 | 4.98 | 5.00 | 5.02 | 5.05 | 5.07 | 5.09 | 5.11 |
| 1979 | 0.83 | 0.86 | 0.90 | 0.93 | 0.96 | 0.99 | 1.03 | 1.06 |
| 1980 | 0.81 | 0.84 | 0.87 | 0.90 | 0.93 | 0.96 | 0.99 | 1.02 |
| 1981-1982 | 0.81 | 0.84 | 0.87 | 0.89 | 0.92 | 0.95 | 0.98 | 1.01 |
| 1983 | 0.80 | 0.83 | 0.86 | 0.88 | 0.91 | 0.94 | 0.96 | 0.99 |
| 1984 | 0.76 | 0.78 | 0.81 | 0.84 | 0.86 | 0.89 | 0.91 | 0.94 |
| 1985 | 0.72 | 0.74 | 0.76 | 0.79 | 0.81 | 0.84 | 0.86 | 0.89 |
| 1986 | 0.67 | 0.70 | 0.72 | 0.74 | 0.77 | 0.79 | 0.81 | 0.84 |
| 1987 | 0.64 | 0.66 | 0.68 | 0.70 | 0.73 | 0.75 | 0.77 | 0.79 |
| 1988-1989 | 0.59 | 0.61 | 0.63 | 0.65 | 0.67 | 0.69 | 0.72 | 0.74 |
| 1990+ | 0.56 | 0.58 | 0.61 | 0.63 | 0.65 | 0.67 | 0.69 | 0.71 |

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TABLE 1.3.2A

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EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
LIGHT DUTY GASOLINE POWERED TRUCKS II
TOTAL HC (INCLUDES EVAP & CRANKCASE)

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 23.4 | 1962 | 23.4 | 1963 | 23.4 | 1964 | 23.4 | 1965 | 23.4 | 1966 | 23.4 | 1967 | 23.4 | 1968 | 17.7 | 1969 | 17.7 | 1970 | 16.1 | 1971 | 16.1 | 1972 | 16.1 |
| 1962 | 23.3 | 1963 | 23.3 | 1964 | 23.3 | 1965 | 23.3 | 1966 | 23.3 | 1967 | 23.3 | 1968 | 17.6 | 1969 | 17.6 | 1970 | 16.0 | 1971 | 16.0 | 1972 | 16.0 | 1973 | 16.0 |
| 1963 | 23.2 | 1964 | 23.2 | 1965 | 23.2 | 1966 | 23.2 | 1967 | 23.2 | 1968 | 17.5 | 1969 | 17.5 | 1970 | 15.9 | 1971 | 15.9 | 1972 | 15.9 | 1973 | 15.9 | 1974 | 14.4 |
| 1964 | 23.2 | 1965 | 23.2 | 1966 | 23.2 | 1967 | 23.2 | 1968 | 17.5 | 1969 | 17.5 | 1970 | 15.8 | 1971 | 15.8 | 1972 | 15.8 | 1973 | 15.8 | 1974 | 14.4 | 1975 | 14.4 |
| 1965 | 23.1 | 1966 | 23.1 | 1967 | 23.1 | 1968 | 17.4 | 1969 | 17.4 | 1970 | 15.6 | 1971 | 15.6 | 1972 | 15.6 | 1973 | 15.6 | 1974 | 14.3 | 1975 | 14.3 | 1976 | 14.3 |
| 1966 | 22.9 | 1967 | 22.9 | 1968 | 17.2 | 1969 | 17.2 | 1970 | 15.5 | 1971 | 15.5 | 1972 | 15.5 | 1973 | 15.5 | 1974 | 14.2 | 1975 | 14.2 | 1976 | 14.2 | 1977 | 14.2 |
| 1967 | 22.8 | 1968 | 17.1 | 1969 | 17.1 | 1970 | 15.3 | 1971 | 15.3 | 1972 | 15.3 | 1973 | 15.3 | 1974 | 14.0 | 1975 | 14.0 | 1976 | 14.0 | 1977 | 14.0 | 1978 | 14.0 |
| 1968 | 17.0 | 1969 | 17.0 | 1970 | 15.1 | 1971 | 15.1 | 1972 | 15.1 | 1973 | 15.1 | 1974 | 13.9 | 1975 | 13.9 | 1976 | 13.9 | 1977 | 13.9 | 1978 | 13.9 | 1979 | 5.8 |
| 1969 | 16.9 | 1970 | 14.9 | 1971 | 14.9 | 1972 | 14.9 | 1973 | 14.9 | 1974 | 13.8 | 1975 | 13.8 | 1976 | 13.8 | 1977 | 13.8 | 1978 | 13.8 | 1979 | 5.6 | 1980 | 5.6 |
| 1970 | 14.7 | 1971 | 14.7 | 1972 | 14.7 | 1973 | 14.7 | 1974 | 13.6 | 1975 | 13.6 | 1976 | 13.6 | 1977 | 13.6 | 1978 | 13.6 | 1979 | 5.4 | 1980 | 5.4 | 1981 | 4.4 |
| 1971 | 14.5 | 1972 | 14.5 | 1973 | 14.5 | 1974 | 13.5 | 1975 | 13.5 | 1976 | 13.5 | 1977 | 13.5 | 1978 | 13.5 | 1979 | 5.2 | 1980 | 5.2 | 1981 | 4.2 | 1982 | 4.2 |
| 1972 | 14.2 | 1973 | 14.2 | 1974 | 13.3 | 1975 | 13.3 | 1976 | 13.3 | 1977 | 13.3 | 1978 | 13.3 | 1979 | 4.9 | 1980 | 4.9 | 1981 | 4.0 | 1982 | 4.0 | 1983 | 4.0 |
| 1973 | 14.0 | 1974 | 13.1 | 1975 | 13.1 | 1976 | 13.1 | 1977 | 13.1 | 1978 | 13.1 | 1979 | 4.6 | 1980 | 4.6 | 1981 | 3.8 | 1982 | 3.8 | 1983 | 3.8 | 1984 | 2.8 |
| 1974 | 12.9 | 1975 | 12.9 | 1976 | 12.9 | 1977 | 12.9 | 1978 | 12.9 | 1979 | 4.3 | 1980 | 4.3 | 1981 | 3.6 | 1982 | 3.6 | 1983 | 3.6 | 1984 | 2.7 | 1985 | 2.0 |
| 1975 | 12.7 | 1976 | 12.7 | 1977 | 12.7 | 1978 | 12.7 | 1979 | 3.9 | 1980 | 3.9 | 1981 | 3.3 | 1982 | 3.3 | 1983 | 3.3 | 1984 | 2.5 | 1985 | 1.9 | 1986 | 1.8 |
| 1976 | 12.5 | 1977 | 12.5 | 1978 | 12.5 | 1979 | 3.6 | 1980 | 3.6 | 1981 | 3.1 | 1982 | 3.1 | 1983 | 3.1 | 1984 | 2.3 | 1985 | 1.8 | 1986 | 1.7 | 1987 | 1.7 |
| 1977 | 12.3 | 1978 | 12.3 | 1979 | 3.2 | 1980 | 3.2 | 1981 | 2.8 | 1982 | 2.8 | 1983 | 2.8 | 1984 | 2.1 | 1985 | 1.7 | 1986 | 1.6 | 1987 | 1.6 | 1988 | 1.6 |
| 1978 | 12.0 | 1979 | 2.7 | 1980 | 2.7 | 1981 | 2.5 | 1982 | 2.5 | 1983 | 2.5 | 1984 | 1.9 | 1985 | 1.6 | 1986 | 1.5 | 1987 | 1.5 | 1988 | 1.5 | 1989 | 1.5 |
| 1979 | 2.3 | 1980 | 2.3 | 1981 | 2.2 | 1982 | 2.2 | 1983 | 2.2 | 1984 | 1.7 | 1985 | 1.4 | 1986 | 1.4 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 |
| 1980 | 2.0 | 1981 | 1.9 | 1982 | 1.9 | 1983 | 1.9 | 1984 | 1.6 | 1985 | 1.4 | 1986 | 1.3 | 1987 | 1.3 | 1988 | 1.3 | 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 16.1 | 1974 | 14.6 | 1975 | 14.6 | 1976 | 14.6 | 1977 | 14.6 | 1978 | 14.6 | 1979 | 6.9 | 1980 | 6.9 | 1981 | 5.4 | 1982 | 5.4 | 1983 | 5.4 | 1984 | 3.9 |
| 1974 | 14.5 | 1975 | 14.5 | 1976 | 14.5 | 1977 | 14.5 | 1978 | 14.5 | 1979 | 6.8 | 1980 | 6.8 | 1981 | 5.3 | 1982 | 5.3 | 1983 | 5.3 | 1984 | 3.9 | 1985 | 2.6 |
| 1975 | 14.4 | 1976 | 14.4 | 1977 | 14.4 | 1978 | 14.4 | 1979 | 6.7 | 1980 | 6.7 | 1981 | 5.3 | 1982 | 5.3 | 1983 | 5.3 | 1984 | 3.8 | 1985 | 2.6 | 1986 | 2.5 |
| 1976 | 14.4 | 1977 | 14.4 | 1978 | 14.4 | 1979 | 6.5 | 1980 | 6.5 | 1981 | 5.2 | 1982 | 5.2 | 1983 | 5.2 | 1984 | 3.7 | 1985 | 2.5 | 1986 | 2.5 | 1987 | 2.4 |
| 1977 | 14.3 | 1978 | 14.3 | 1979 | 6.4 | 1980 | 6.4 | 1981 | 5.0 | 1982 | 5.0 | 1983 | 5.0 | 1984 | 3.7 | 1985 | 2.5 | 1986 | 2.5 | 1987 | 2.3 | 1988 | 2.3 |
| 1978 | 14.2 | 1979 | 6.2 | 1980 | 6.2 | 1981 | 4.9 | 1982 | 4.9 | 1983 | 4.9 | 1984 | 3.6 | 1985 | 2.5 | 1986 | 2.4 | 1987 | 2.3 | 1988 | 2.2 | 1989 | 2.2 |
| 1979 | 6.0 | 1980 | 6.0 | 1981 | 4.8 | 1982 | 4.8 | 1983 | 4.8 | 1984 | 3.5 | 1985 | 2.4 | 1986 | 2.4 | 1987 | 2.2 | 1988 | 2.2 | 1989 | 2.2 | 1990 | 2.2 |
| 1980 | 5.8 | 1981 | 4.7 | 1982 | 4.7 | 1983 | 4.7 | 1984 | 3.4 | 1985 | 2.4 | 1986 | 2.3 | 1987 | 2.2 | 1988 | 2.2 | 1989 | 2.2 | 1990 | 2.1 | 1991 | 2.1 |
| 1981 | 4.5 | 1982 | 4.5 | 1983 | 4.5 | 1984 | 3.3 | 1985 | 2.3 | 1986 | 2.3 | 1987 | 2.2 | 1988 | 2.1 | 1989 | 2.1 | 1990 | 2.1 | 1991 | 2.1 | 1992 | 2.1 |
| 1982 | 4.4 | 1983 | 4.4 | 1984 | 3.2 | 1985 | 2.2 | 1986 | 2.2 | 1987 | 2.1 | 1988 | 2.1 | 1989 | 2.1 | 1990 | 2.0 | 1991 | 2.0 | 1992 | 2.0 | 1993 | 2.0 |
| 1983 | 4.2 | 1984 | 3.1 | 1985 | 2.2 | 1986 | 2.1 | 1987 | 2.0 | 1988 | 2.0 | 1989 | 2.0 | 1990 | 2.0 | 1991 | 2.0 | 1992 | 2.0 | 1993 | 2.0 | 1994 | 2.0 |
| 1984 | 3.0 | 1985 | 2.1 | 1986 | 2.1 | 1987 | 2.0 | 1988 | 2.0 | 1989 | 2.0 | 1990 | 1.9 | 1991 | 1.9 | 1992 | 1.9 | 1993 | 1.9 | 1994 | 1.9 | 1995 | 1.9 |
| 1985 | 2.0 | 1986 | 2.0 | 1987 | 1.9 | 1988 | 1.9 | 1989 | 1.9 | 1990 | 1.9 | 1991 | 1.9 | 1992 | 1.9 | 1993 | 1.9 | 1994 | 1.9 | 1995 | 1.9 | 1996 | 1.9 |
| 1986 | 1.9 | 1987 | 1.9 | 1988 | 1.8 | 1989 | 1.8 | 1990 | 1.8 | 1991 | 1.8 | 1992 | 1.8 | 1993 | 1.8 | 1994 | 1.8 | 1995 | 1.8 | 1996 | 1.8 | 1997 | 1.8 |
| 1987 | 1.8 | 1988 | 1.7 | 1989 | 1.7 | 1990 | 1.7 | 1991 | 1.7 | 1992 | 1.7 | 1993 | 1.7 | 1994 | 1.7 | 1995 | 1.7 | 1996 | 1.7 | 1997 | 1.7 | 1998 | 1.7 |
| 1988 | 1.7 | 1989 | 1.7 | 1990 | 1.6 | 1991 | 1.6 | 1992 | 1.6 | 1993 | 1.6 | 1994 | 1.6 | 1995 | 1.6 | 1996 | 1.6 | 1997 | 1.6 | 1998 | 1.6 | 1999 | 1.6 |
| 1989 | 1.6 | 1990 | 1.6 | 1991 | 1.6 | 1992 | 1.6 | 1993 | 1.6 | 1994 | 1.6 | 1995 | 1.6 | 1996 | 1.6 | 1997 | 1.6 | 1998 | 1.6 | 1999 | 1.6 | 2000 | 1.6 |
| 1990 | 1.5 | 1991 | 1.5 | 1992 | 1.5 | 1993 | 1.5 | 1994 | 1.5 | 1995 | 1.5 | 1996 | 1.5 | 1997 | 1.5 | 1998 | 1.5 | 1999 | 1.5 | 2000 | 1.5 | 2001 | 1.5 |
| 1991 | 1.4 | 1992 | 1.4 | 1993 | 1.4 | 1994 | 1.4 | 1995 | 1.4 | 1996 | 1.4 | 1997 | 1.4 | 1998 | 1.4 | 1999 | 1.4 | 2000 | 1.4 | 2001 | 1.4 | 2002 | 1.4 |
| 1992 | 1.3 | 1993 | 1.3 | 1994 | 1.3 | 1995 | 1.3 | 1996 | 1.3 | 1997 | 1.3 | 1998 | 1.3 | 1999 | 1.3 | 2000 | 1.3 | 2001 | 1.3 | 2002 | 1.3 | 2003 | 1.3 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.3.4.

TABLE 1.3.2B

DATE : MAY 25, 1985

# EXHAUST EMISSION LEVELS FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS II
## CO

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 135.3 | 1962 | 135.3 | 1963 | 135.3 | 1964 | 135.3 | 1965 | 135.3 | 1966 | 135.3 | 1967 | 135.3 | 1968 | 135.3 | 1969 | 135.3 | 1970 | 107.1 | 1971 | 107.1 | 1972 | 107.1 |
| 1962 | 134.3 | 1963 | 134.3 | 1964 | 134.3 | 1965 | 134.3 | 1966 | 134.3 | 1967 | 134.3 | 1968 | 134.3 | 1969 | 134.3 | 1970 | 106.0 | 1971 | 106.0 | 1972 | 106.0 | 1973 | 106.0 |
| 1963 | 133.2 | 1964 | 133.2 | 1965 | 133.2 | 1966 | 133.2 | 1967 | 133.2 | 1968 | 133.2 | 1969 | 133.2 | 1970 | 104.7 | 1971 | 104.7 | 1972 | 104.7 | 1973 | 104.7 | 1974 | 102.8 |
| 1964 | 132.1 | 1965 | 132.1 | 1966 | 132.1 | 1967 | 132.1 | 1968 | 132.1 | 1969 | 132.1 | 1970 | 103.4 | 1971 | 103.4 | 1972 | 103.4 | 1973 | 103.4 | 1974 | 101.5 | 1975 | 101.5 |
| 1965 | 130.8 | 1966 | 130.8 | 1967 | 130.8 | 1968 | 130.8 | 1969 | 130.8 | 1970 | 102.0 | 1971 | 102.0 | 1972 | 102.0 | 1973 | 102.0 | 1974 | 100.1 | 1975 | 100.1 | 1976 | 100.1 |
| 1966 | 129.4 | 1967 | 129.4 | 1968 | 129.4 | 1969 | 129.4 | 1970 | 100.4 | 1971 | 100.4 | 1972 | 100.4 | 1973 | 100.4 | 1974 | 98.6 | 1975 | 98.6 | 1976 | 98.6 | 1977 | 98.6 |
| 1967 | 127.9 | 1968 | 127.9 | 1969 | 127.9 | 1970 | 98.7 | 1971 | 98.7 | 1972 | 98.7 | 1973 | 98.7 | 1974 | 97.0 | 1975 | 97.0 | 1976 | 97.0 | 1977 | 97.0 | 1978 | 97.0 |
| 1968 | 126.3 | 1969 | 126.3 | 1970 | 96.9 | 1971 | 96.9 | 1972 | 96.9 | 1973 | 96.9 | 1974 | 95.3 | 1975 | 95.3 | 1976 | 95.3 | 1977 | 95.3 | 1978 | 95.3 | 1979 | 51.2 |
| 1969 | 124.6 | 1970 | 94.9 | 1971 | 94.9 | 1972 | 94.9 | 1973 | 94.9 | 1974 | 93.4 | 1975 | 93.4 | 1976 | 93.4 | 1977 | 93.4 | 1978 | 93.4 | 1979 | 49.2 | 1980 | 49.2 |
| 1970 | 92.7 | 1971 | 92.7 | 1972 | 92.7 | 1973 | 92.7 | 1974 | 91.3 | 1975 | 91.3 | 1976 | 91.3 | 1977 | 91.3 | 1978 | 91.3 | 1979 | 47.0 | 1980 | 47.0 | 1981 | 28.2 |
| 1971 | 90.4 | 1972 | 90.4 | 1973 | 90.4 | 1974 | 89.1 | 1975 | 89.1 | 1976 | 89.1 | 1977 | 89.1 | 1978 | 89.1 | 1979 | 44.6 | 1980 | 44.6 | 1981 | 27.2 | 1982 | 27.2 |
| 1972 | 87.9 | 1973 | 87.9 | 1974 | 86.7 | 1975 | 86.7 | 1976 | 86.7 | 1977 | 86.7 | 1978 | 86.7 | 1979 | 42.1 | 1980 | 42.1 | 1981 | 26.0 | 1982 | 26.0 | 1983 | 26.0 |
| 1973 | 85.2 | 1974 | 84.1 | 1975 | 84.1 | 1976 | 84.1 | 1977 | 84.1 | 1978 | 84.1 | 1979 | 39.3 | 1980 | 39.3 | 1981 | 24.8 | 1982 | 24.8 | 1983 | 24.8 | 1984 | 17.1 |
| 1974 | 81.3 | 1975 | 81.3 | 1976 | 81.3 | 1977 | 81.3 | 1978 | 81.3 | 1979 | 36.3 | 1980 | 36.3 | 1981 | 23.5 | 1982 | 23.5 | 1983 | 23.5 | 1984 | 16.0 | 1985 | 10.7 |
| 1975 | 78.2 | 1976 | 78.2 | 1977 | 78.2 | 1978 | 78.2 | 1979 | 33.1 | 1980 | 33.1 | 1981 | 22.1 | 1982 | 22.1 | 1983 | 22.1 | 1984 | 14.7 | 1985 | 10.1 | 1986 | 10.1 |
| 1976 | 74.9 | 1977 | 74.9 | 1978 | 74.9 | 1979 | 29.6 | 1980 | 29.6 | 1981 | 20.6 | 1982 | 20.6 | 1983 | 20.6 | 1984 | 13.4 | 1985 | 9.4 | 1986 | 9.4 | 1987 | 11.2 |
| 1977 | 71.3 | 1978 | 71.3 | 1979 | 25.8 | 1980 | 25.8 | 1981 | 18.9 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 12.0 | 1985 | 8.7 | 1986 | 8.7 | 1987 | 9.8 | 1988 | 9.8 |
| 1978 | 67.4 | 1979 | 21.6 | 1980 | 21.6 | 1981 | 17.1 | 1982 | 17.1 | 1983 | 17.1 | 1984 | 10.4 | 1985 | 7.9 | 1986 | 7.9 | 1987 | 8.4 | 1988 | 8.4 | 1989 | 8.4 |
| 1979 | 17.2 | 1980 | 17.2 | 1981 | 15.2 | 1982 | 15.2 | 1983 | 15.2 | 1984 | 8.7 | 1985 | 7.1 | 1986 | 7.1 | 1987 | 6.8 | 1988 | 6.8 | 1989 | 6.8 | 1990 | 6.8 |
| 1980 | 14.2 | 1981 | 13.9 | 1982 | 13.9 | 1983 | 13.9 | 1984 | 7.6 | 1985 | 6.5 | 1986 | 6.5 | 1987 | 5.8 | 1988 | 5.8 | 1989 | 5.8 | 1990 | 5.8 | 1991 | 5.8 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 107.1 | 1974 | 105.1 | 1975 | 105.1 | 1976 | 105.1 | 1977 | 105.1 | 1978 | 105.1 | 1979 | 61.6 | 1980 | 61.6 | 1981 | 34.5 | 1982 | 34.5 | 1983 | 34.5 | 1984 | 25.5 |
| 1974 | 104.0 | 1975 | 104.0 | 1976 | 104.0 | 1977 | 104.0 | 1978 | 104.0 | 1979 | 60.4 | 1980 | 60.4 | 1981 | 34.0 | 1982 | 34.0 | 1983 | 34.0 | 1984 | 25.1 | 1985 | 15.3 |
| 1975 | 102.8 | 1976 | 102.8 | 1977 | 102.8 | 1978 | 102.8 | 1979 | 59.2 | 1980 | 59.2 | 1981 | 33.5 | 1982 | 33.5 | 1983 | 33.5 | 1984 | 24.6 | 1985 | 15.0 | 1986 | 15.0 |
| 1976 | 101.5 | 1977 | 101.5 | 1978 | 101.5 | 1979 | 57.8 | 1980 | 57.8 | 1981 | 32.9 | 1982 | 32.9 | 1983 | 32.9 | 1984 | 24.1 | 1985 | 14.8 | 1986 | 14.8 | 1987 | 21.1 |
| 1977 | 100.1 | 1978 | 100.1 | 1979 | 56.4 | 1980 | 56.4 | 1981 | 32.3 | 1982 | 32.3 | 1983 | 32.3 | 1984 | 23.6 | 1985 | 14.5 | 1986 | 14.5 | 1987 | 20.6 | 1988 | 20.6 |
| 1978 | 98.6 | 1979 | 54.8 | 1980 | 54.8 | 1981 | 31.6 | 1982 | 31.6 | 1983 | 31.6 | 1984 | 23.0 | 1985 | 14.2 | 1986 | 14.2 | 1987 | 20.0 | 1988 | 20.0 | 1989 | 20.0 |
| 1979 | 53.1 | 1980 | 53.1 | 1981 | 30.8 | 1982 | 30.8 | 1983 | 30.8 | 1984 | 22.3 | 1985 | 13.9 | 1986 | 13.9 | 1987 | 19.4 | 1988 | 19.4 | 1989 | 19.4 | 1990 | 19.4 |
| 1980 | 51.2 | 1981 | 30.0 | 1982 | 30.0 | 1983 | 30.0 | 1984 | 21.6 | 1985 | 13.5 | 1986 | 13.5 | 1987 | 18.8 | 1988 | 18.8 | 1989 | 18.8 | 1990 | 18.8 | 1991 | 18.8 |
| 1981 | 29.1 | 1982 | 29.1 | 1983 | 29.1 | 1984 | 20.8 | 1985 | 13.1 | 1986 | 13.1 | 1987 | 18.1 | 1988 | 18.1 | 1989 | 18.1 | 1990 | 18.1 | 1991 | 18.1 | 1992 | 18.1 |
| 1982 | 28.2 | 1983 | 28.2 | 1984 | 20.0 | 1985 | 12.7 | 1986 | 12.7 | 1987 | 17.3 | 1988 | 17.3 | 1989 | 17.3 | 1990 | 17.3 | 1991 | 17.3 | 1992 | 17.3 | 1993 | 17.3 |
| 1983 | 27.2 | 1984 | 19.1 | 1985 | 12.3 | 1986 | 12.3 | 1987 | 16.5 | 1988 | 16.5 | 1989 | 16.5 | 1990 | 16.5 | 1991 | 16.5 | 1992 | 16.5 | 1993 | 16.5 | 1994 | 16.5 |
| 1984 | 18.2 | 1985 | 11.8 | 1986 | 11.8 | 1987 | 15.6 | 1988 | 15.6 | 1989 | 15.6 | 1990 | 15.6 | 1991 | 15.6 | 1992 | 15.6 | 1993 | 15.6 | 1994 | 15.6 | 1995 | 15.6 |
| 1985 | 11.3 | 1986 | 11.3 | 1987 | 14.6 | 1988 | 14.6 | 1989 | 14.6 | 1990 | 14.6 | 1991 | 14.6 | 1992 | 14.6 | 1993 | 14.6 | 1994 | 14.6 | 1995 | 14.6 | 1996 | 14.6 |
| 1986 | 10.7 | 1987 | 13.6 | 1988 | 13.6 | 1989 | 13.6 | 1990 | 13.6 | 1991 | 13.6 | 1992 | 13.6 | 1993 | 13.6 | 1994 | 13.6 | 1995 | 13.6 | 1996 | 13.6 | 1997 | 13.6 |
| 1987 | 12.4 | 1988 | 12.4 | 1989 | 12.4 | 1990 | 12.4 | 1991 | 12.4 | 1992 | 12.4 | 1993 | 12.4 | 1994 | 12.4 | 1995 | 12.4 | 1996 | 12.4 | 1997 | 12.4 | 1998 | 12.4 |
| 1988 | 11.2 | 1989 | 11.2 | 1990 | 11.2 | 1991 | 11.2 | 1992 | 11.2 | 1993 | 11.2 | 1994 | 11.2 | 1995 | 11.2 | 1996 | 11.2 | 1997 | 11.2 | 1998 | 11.2 | 1999 | 11.2 |
| 1989 | 9.8 | 1990 | 9.8 | 1991 | 9.8 | 1992 | 9.8 | 1993 | 9.8 | 1994 | 9.8 | 1995 | 9.8 | 1996 | 9.8 | 1997 | 9.8 | 1998 | 9.8 | 1999 | 9.8 | 2000 | 9.8 |
| 1990 | 8.4 | 1991 | 8.4 | 1992 | 8.4 | 1993 | 8.4 | 1994 | 8.4 | 1995 | 8.4 | 1996 | 8.4 | 1997 | 8.4 | 1998 | 8.4 | 1999 | 8.4 | 2000 | 8.4 | 2001 | 8.4 |
| 1991 | 6.8 | 1992 | 6.8 | 1993 | 6.8 | 1994 | 6.8 | 1995 | 6.8 | 1996 | 6.8 | 1997 | 6.8 | 1998 | 6.8 | 1999 | 6.8 | 2000 | 6.8 | 2001 | 6.8 | 2002 | 6.8 |
| 1992 | 5.8 | 1993 | 5.8 | 1994 | 5.8 | 1995 | 5.8 | 1996 | 5.8 | 1997 | 5.8 | 1998 | 5.8 | 1999 | 5.8 | 2000 | 5.8 | 2001 | 5.8 | 2002 | 5.8 | 2003 | 5.8 |

*MY -- Indicates the model year

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.3.4.

TABLE 1.3.2C

DATE : MAY 25, 1985

# EXHAUST EMISSION LEVELS FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS II
## NOx

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 5.4 | 1962 | 5.4 | 1963 | 5.4 | 1964 | 5.4 | 1965 | 5.4 | 1966 | 5.4 | 1967 | 5.4 | 1968 | 5.4 | 1969 | 5.4 | 1970 | 6.4 | 1971 | 6.4 | 1972 | 6.4 |
| 1962 | 5.4 | 1963 | 5.4 | 1964 | 5.4 | 1965 | 5.4 | 1966 | 5.4 | 1967 | 5.4 | 1968 | 5.4 | 1969 | 5.4 | 1970 | 6.4 | 1971 | 6.4 | 1972 | 6.4 | 1973 | 6.4 |
| 1963 | 5.4 | 1964 | 5.4 | 1965 | 5.4 | 1966 | 5.4 | 1967 | 5.4 | 1968 | 5.4 | 1969 | 5.4 | 1970 | 6.4 | 1971 | 6.4 | 1972 | 6.4 | 1973 | 6.4 | 1974 | 5.3 |
| 1964 | 5.4 | 1965 | 5.4 | 1966 | 5.4 | 1967 | 5.4 | 1968 | 5.4 | 1969 | 5.4 | 1970 | 6.4 | 1971 | 6.4 | 1972 | 6.4 | 1973 | 6.4 | 1974 | 5.3 | 1975 | 5.3 |
| 1965 | 5.4 | 1966 | 5.4 | 1967 | 5.4 | 1968 | 5.4 | 1969 | 5.4 | 1970 | 6.4 | 1971 | 6.4 | 1972 | 6.4 | 1973 | 6.4 | 1974 | 5.3 | 1975 | 5.3 | 1976 | 5.3 |
| 1966 | 5.4 | 1967 | 5.4 | 1968 | 5.4 | 1969 | 5.4 | 1970 | 6.4 | 1971 | 6.4 | 1972 | 6.4 | 1973 | 6.4 | 1974 | 5.2 | 1975 | 5.2 | 1976 | 5.2 | 1977 | 5.2 |
| 1967 | 5.4 | 1968 | 5.4 | 1969 | 5.4 | 1970 | 6.4 | 1971 | 6.4 | 1972 | 6.4 | 1973 | 6.4 | 1974 | 5.2 | 1975 | 5.2 | 1976 | 5.2 | 1977 | 5.2 | 1978 | 5.2 |
| 1968 | 5.4 | 1969 | 5.4 | 1970 | 6.4 | 1971 | 6.4 | 1972 | 6.4 | 1973 | 6.4 | 1974 | 5.2 | 1975 | 5.2 | 1976 | 5.2 | 1977 | 5.2 | 1978 | 5.2 | 1979 | 3.0 |
| 1969 | 5.4 | 1970 | 6.4 | 1971 | 6.4 | 1972 | 6.4 | 1973 | 6.4 | 1974 | 5.2 | 1975 | 5.2 | 1976 | 5.2 | 1977 | 5.2 | 1978 | 5.2 | 1979 | 3.0 | 1980 | 3.0 |
| 1970 | 6.4 | 1971 | 6.4 | 1972 | 6.4 | 1973 | 6.4 | 1974 | 5.1 | 1975 | 5.1 | 1976 | 5.1 | 1977 | 5.1 | 1978 | 5.1 | 1979 | 2.9 | 1980 | 2.9 | 1981 | 2.9 |
| 1971 | 6.4 | 1972 | 6.4 | 1973 | 6.4 | 1974 | 5.1 | 1975 | 5.1 | 1976 | 5.1 | 1977 | 5.1 | 1978 | 5.1 | 1979 | 2.8 | 1980 | 2.8 | 1981 | 2.8 | 1982 | 2.8 |
| 1972 | 6.4 | 1973 | 6.4 | 1974 | 5.0 | 1975 | 5.0 | 1976 | 5.0 | 1977 | 5.0 | 1978 | 5.0 | 1979 | 2.7 | 1980 | 2.7 | 1981 | 2.7 | 1982 | 2.7 | 1983 | 2.7 |
| 1973 | 6.4 | 1974 | 5.0 | 1975 | 5.0 | 1976 | 5.0 | 1977 | 5.0 | 1978 | 5.0 | 1979 | 2.6 | 1980 | 2.6 | 1981 | 2.6 | 1982 | 2.6 | 1983 | 2.6 | 1984 | 2.6 |
| 1974 | 5.0 | 1975 | 5.0 | 1976 | 5.0 | 1977 | 5.0 | 1978 | 5.0 | 1979 | 2.5 | 1980 | 2.5 | 1981 | 2.5 | 1982 | 2.5 | 1983 | 2.5 | 1984 | 2.5 | 1985 | 2.1 |
| 1975 | 4.9 | 1976 | 4.9 | 1977 | 4.9 | 1978 | 4.9 | 1979 | 2.4 | 1980 | 2.4 | 1981 | 2.4 | 1982 | 2.4 | 1983 | 2.4 | 1984 | 2.4 | 1985 | 2.0 | 1986 | 2.0 |
| 1976 | 4.8 | 1977 | 4.8 | 1978 | 4.8 | 1979 | 2.3 | 1980 | 2.3 | 1981 | 2.3 | 1982 | 2.3 | 1983 | 2.3 | 1984 | 2.3 | 1985 | 2.0 | 1986 | 2.0 | 1987 | 1.1 |
| 1977 | 4.8 | 1978 | 4.8 | 1979 | 2.2 | 1980 | 2.2 | 1981 | 2.2 | 1982 | 2.2 | 1983 | 2.2 | 1984 | 2.2 | 1985 | 1.9 | 1986 | 1.9 | 1987 | 1.0 | 1988 | 1.0 |
| 1978 | 4.7 | 1979 | 2.0 | 1980 | 2.0 | 1981 | 2.0 | 1982 | 2.0 | 1983 | 2.0 | 1984 | 2.0 | 1985 | 1.9 | 1986 | 1.9 | 1987 | 1.0 | 1988 | 1.0 | 1989 | 1.0 |
| 1979 | 1.9 | 1980 | 1.9 | 1981 | 1.9 | 1982 | 1.9 | 1983 | 1.9 | 1984 | 1.9 | 1985 | 1.8 | 1986 | 1.8 | 1987 | 0.9 | 1988 | 0.9 | 1989 | 0.9 | 1990 | 0.9 |
| 1980 | 1.8 | 1981 | 1.8 | 1982 | 1.8 | 1983 | 1.8 | 1984 | 1.8 | 1985 | 1.7 | 1986 | 1.7 | 1987 | 0.9 | 1988 | 0.9 | 1989 | 0.9 | 1990 | 0.9 | 1991 | 0.9 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 6.4 | 1974 | 5.3 | 1975 | 5.3 | 1976 | 5.3 | 1977 | 5.3 | 1978 | 5.3 | 1979 | 3.4 | 1980 | 3.4 | 1981 | 3.4 | 1982 | 3.4 | 1983 | 3.4 | 1984 | 3.4 |
| 1974 | 5.3 | 1975 | 5.3 | 1976 | 5.3 | 1977 | 5.3 | 1978 | 5.3 | 1979 | 3.4 | 1980 | 3.4 | 1981 | 3.4 | 1982 | 3.4 | 1983 | 3.4 | 1984 | 3.4 | 1985 | 2.5 |
| 1975 | 5.3 | 1976 | 5.3 | 1977 | 5.3 | 1978 | 5.3 | 1979 | 3.3 | 1980 | 3.3 | 1981 | 3.3 | 1982 | 3.3 | 1983 | 3.3 | 1984 | 3.3 | 1985 | 2.4 | 1986 | 2.4 |
| 1976 | 5.3 | 1977 | 5.3 | 1978 | 5.3 | 1979 | 3.3 | 1980 | 3.3 | 1981 | 3.3 | 1982 | 3.3 | 1983 | 3.3 | 1984 | 3.3 | 1985 | 2.4 | 1986 | 2.4 | 1987 | 1.5 |
| 1977 | 5.3 | 1978 | 5.3 | 1979 | 3.2 | 1980 | 3.2 | 1981 | 3.2 | 1982 | 3.2 | 1983 | 3.2 | 1984 | 3.2 | 1985 | 2.4 | 1986 | 2.4 | 1987 | 1.5 | 1988 | 1.5 |
| 1978 | 5.2 | 1979 | 3.2 | 1980 | 3.2 | 1981 | 3.2 | 1982 | 3.2 | 1983 | 3.2 | 1984 | 3.2 | 1985 | 2.4 | 1986 | 2.4 | 1987 | 1.5 | 1988 | 1.5 | 1989 | 1.5 |
| 1979 | 3.1 | 1980 | 3.1 | 1981 | 3.1 | 1982 | 3.1 | 1983 | 3.1 | 1984 | 3.1 | 1985 | 2.3 | 1986 | 2.3 | 1987 | 1.5 | 1988 | 1.5 | 1989 | 1.5 | 1990 | 1.5 |
| 1980 | 3.0 | 1981 | 3.0 | 1982 | 3.0 | 1983 | 3.0 | 1984 | 3.0 | 1985 | 2.3 | 1986 | 2.3 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 | 1991 | 1.4 |
| 1981 | 3.0 | 1982 | 3.0 | 1983 | 3.0 | 1984 | 3.0 | 1985 | 2.3 | 1986 | 2.3 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 | 1991 | 1.4 | 1992 | 1.4 |
| 1982 | 2.9 | 1983 | 2.9 | 1984 | 2.9 | 1985 | 2.3 | 1986 | 2.3 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 | 1991 | 1.4 | 1992 | 1.4 | 1993 | 1.4 |
| 1983 | 2.8 | 1984 | 2.8 | 1985 | 2.2 | 1986 | 2.2 | 1987 | 1.3 | 1988 | 1.3 | 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 | 1993 | 1.3 | 1994 | 1.3 |
| 1984 | 2.7 | 1985 | 2.2 | 1986 | 2.2 | 1987 | 1.3 | 1988 | 1.3 | 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 | 1993 | 1.3 | 1994 | 1.3 | 1995 | 1.3 |
| 1985 | 2.1 | 1986 | 2.1 | 1987 | 1.3 | 1988 | 1.3 | 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 | 1993 | 1.3 | 1994 | 1.3 | 1995 | 1.3 | 1996 | 1.3 |
| 1986 | 2.1 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 | 1991 | 1.2 | 1992 | 1.2 | 1993 | 1.2 | 1994 | 1.2 | 1995 | 1.2 | 1996 | 1.2 | 1997 | 1.2 |
| 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 | 1991 | 1.2 | 1992 | 1.2 | 1993 | 1.2 | 1994 | 1.2 | 1995 | 1.2 | 1996 | 1.2 | 1997 | 1.2 | 1998 | 1.2 |
| 1988 | 1.1 | 1989 | 1.1 | 1990 | 1.1 | 1991 | 1.1 | 1992 | 1.1 | 1993 | 1.1 | 1994 | 1.1 | 1995 | 1.1 | 1996 | 1.1 | 1997 | 1.1 | 1998 | 1.1 | 1999 | 1.1 |
| 1989 | 1.0 | 1990 | 1.0 | 1991 | 1.0 | 1992 | 1.0 | 1993 | 1.0 | 1994 | 1.0 | 1995 | 1.0 | 1996 | 1.0 | 1997 | 1.0 | 1998 | 1.0 | 1999 | 1.0 | 2000 | 1.0 |
| 1990 | 1.0 | 1991 | 1.0 | 1992 | 1.0 | 1993 | 1.0 | 1994 | 1.0 | 1995 | 1.0 | 1996 | 1.0 | 1997 | 1.0 | 1998 | 1.0 | 1999 | 1.0 | 2000 | 1.0 | 2001 | 1.0 |
| 1991 | 0.9 | 1992 | 0.9 | 1993 | 0.9 | 1994 | 0.9 | 1995 | 0.9 | 1996 | 0.9 | 1997 | 0.9 | 1998 | 0.9 | 1999 | 0.9 | 2000 | 0.9 | 2001 | 0.9 | 2002 | 0.9 |
| 1992 | 0.9 | 1993 | 0.9 | 1994 | 0.9 | 1995 | 0.9 | 1996 | 0.9 | 1997 | 0.9 | 1998 | 0.9 | 1999 | 0.9 | 2000 | 0.9 | 2001 | 0.9 | 2002 | 0.9 | 2003 | 0.9 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.3.4.

## TABLE 1.3.3

## IDLE EMISSION RATES FOR
## LOW ALTITUDE
## LIGHT DUTY GASOLINE POWERED TRUCKS II

* IER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Min.) | Deterioration Rate (Gm/Min/10K Mi) |
|---|---|---|---|
| HC | Pre-1970 | 1.67 | 0.03 |
| | 1970-1973 | 1.06 | 0.04 |
| | 1974-1978 | 1.06 | 0.03 |
| | 1979-1980 | 0.07 | 0.02 |
| | 1981-1983 | 0.06 | 0.02 |
| | 1984 | 0.04 | 0.01 |
| | 1985-1986 | 0.03 | 0.01 |
| | 1987+ | 0.03 | 0.01 |
| CO | Pre-1970 | 18.98 | 0.45 |
| | 1970-1973 | 11.53 | 0.52 |
| | 1974-1978 | 11.53 | 0.49 |
| | 1979-1980 | 1.57 | 0.32 |
| | 1981 | 1.31 | 0.27 |
| | 1982-1983 | 1.19 | 0.24 |
| | 1984 | 0.69 | 0.14 |
| | 1985-1986 | 0.34 | 0.18 |
| | 1987+ | 0.34 | 0.18 |
| NOx | Pre-1970 | 0.08 | 0.0 |
| | 1970-1973 | 0.10 | 0.0 |
| | 1974-1978 | 0.07 | 0.0 |
| | 1979-1983 | 0.06 | 0.0 |
| | 1984 | 0.05 | 0.0 |
| | 1985-1986 | 0.02 | 0.0 |
| | 1987+ | 0.02 | 0.0 |

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

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## TABLE 1.3.4

## REGISTRATION MIX AND MILEAGE ACCUMULATION RATES FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS II

| Model Year Index** | July 1 Registration Mix* | Mileage Accumulation Rate per truck * | Jan 1 Registration Mix | Jan 1 Mileage Accumulation Rate (fleet) | Jan 1 Mileage Accumulation (fleet) |
|---|---|---|---|---|---|
| 1 | 0.067 | 18352. | 0.022 | 18352. | 2294. |
| 2 | 0.085 | 16946. | 0.085 | 18000. | 13720. |
| 3 | 0.081 | 15648. | 0.081 | 16621. | 31021. |
| 4 | 0.077 | 14449. | 0.077 | 15348. | 46997. |
| 5 | 0.073 | 13342. | 0.073 | 14172. | 61748. |
| 6 | 0.069 | 12320. | 0.069 | 13086. | 75370. |
| 7 | 0.065 | 11376. | 0.065 | 12084. | 87947. |
| 8 | 0.061 | 10504. | 0.061 | 11158. | 99562. |
| 9 | 0.057 | 9700. | 0.057 | 10303. | 110286. |
| 10 | 0.053 | 8956. | 0.053 | 9514. | 120188. |
| 11 | 0.048 | 8270. | 0.048 | 8784. | 129332. |
| 12 | 0.044 | 7637. | 0.044 | 8112. | 137775. |
| 13 | 0.040 | 7052. | 0.040 | 7491. | 145572. |
| 14 | 0.036 | 6511. | 0.036 | 6917. | 152771. |
| 15 | 0.032 | 6012. | 0.032 | 6386. | 159419. |
| 16 | 0.028 | 5552. | 0.028 | 5897. | 165557. |
| 17 | 0.024 | 5126. | 0.024 | 5445. | 171225. |
| 18 | 0.020 | 4734. | 0.020 | 5028. | 176458. |
| 19 | 0.016 | 4371. | 0.016 | 4643. | 181291. |
| 20+ | 0.024 | 4036. | 0.024 | 4287. | 185753. |

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

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## TABLE 1.3.5

## EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS II JANUARY 1, 1988

| Model Years | (A) LDT2 Fleet Registration | (B) Sales Fraction | (A*B) | (C=A*B/DAF) LDGT2 Registration | (D) Annual Mileage Accrual Rate | (C*D) | (C*D/TFNORM) Travel Fractions |
|---|---|---|---|---|---|---|---|
| 1988 | 0.022 | 0.760 | 0.017 | 0.019 | 18352. | 355.7 | 0.032 |
| 1987 | 0.085 | 0.790 | 0.067 | 0.077 | 18000. | 1380.3 | 0.123 |
| 1986 | 0.081 | 0.820 | 0.066 | 0.076 | 16621. | 1260.7 | 0.112 |
| 1985 | 0.077 | 0.840 | 0.065 | 0.074 | 15348. | 1133.6 | 0.101 |
| 1984 | 0.073 | 0.870 | 0.064 | 0.073 | 14172. | 1027.8 | 0.091 |
| 1983 | 0.069 | 0.900 | 0.062 | 0.071 | 13086. | 928.0 | 0.083 |
| 1982 | 0.065 | 0.920 | 0.060 | 0.068 | 12084. | 825.2 | 0.073 |
| 1981 | 0.061 | 0.940 | 0.057 | 0.065 | 11158. | 730.6 | 0.065 |
| 1980 | 0.057 | 0.966 | 0.055 | 0.063 | 10303. | 647.8 | 0.058 |
| 1979 | 0.053 | 0.972 | 0.052 | 0.059 | 9514. | 559.7 | 0.050 |
| 1978 | 0.048 | 0.991 | 0.048 | 0.054 | 8784. | 477.2 | 0.042 |
| 1977 | 0.044 | 0.995 | 0.044 | 0.050 | 8112. | 405.5 | 0.036 |
| 1976 | 0.040 | 0.997 | 0.040 | 0.046 | 7491. | 341.1 | 0.030 |
| 1975 | 0.036 | 0.998 | 0.036 | 0.041 | 6917. | 283.8 | 0.025 |
| 1974 | 0.032 | 1.000 | 0.032 | 0.037 | 6386. | 233.4 | 0.021 |
| 1973 | 0.028 | 1.000 | 0.028 | 0.032 | 5897. | 188.6 | 0.017 |
| 1972 | 0.024 | 1.000 | 0.024 | 0.027 | 5445. | 149.2 | 0.013 |
| 1971 | 0.020 | 1.000 | 0.020 | 0.023 | 5028. | 114.8 | 0.010 |
| 1970 | 0.016 | 1.000 | 0.016 | 0.018 | 4643. | 84.8 | 0.008 |
| 1969- | 0.024 | 1.000 | 0.024 | 0.027 | 4287. | 117.5 | 0.010 |
|  |  | DAF: | 0.876 |  | TFNORM: | 11245.4 |  |

WHERE :

A = January 1 registration mix from Table 1.3.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 1.3.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI)= .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

NOTE : In general, the travel weighting fractions will change for every calendar year since the sales fraction (column B) changes for almost every model year.

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## TABLE 1.3.6

## SPEED CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS II

* $SCF(s,sadj) = SF(s)/SF(sadj)$

$SF(s) = EXP(A + B*s + C*s^2 + D*S^3 + E*s^4 + F*s^5)$, HC & CO
$= A + B*s + C*s^2 + D*s^3 + E*s^4 + F*s^5$ , NOx,Pre-1979
$= EXP(A + B*s + C*s^2 + D*s^3 + E*s^4 + F*s^5)$, NOx,1979+

| Pollutant and Model Years | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| HC | | | | | | |
| Pre-1970 | 0.231026E+01 | -0.289572E+00 | 0.152990E-01 | -0.446689E-03 | 0.648183E-05 | -0.363456E-07 |
| 1970-1973 | 0.240873E+01 | -0.308187E+00 | 0.168168E-01 | -0.506843E-03 | 0.753855E-05 | -0.431596E-07 |
| 1974-1978 | 0.268382E+01 | -0.344633E+00 | 0.195417E-01 | -0.625720E-03 | 0.978442E-05 | -0.583369E-07 |
| 1979-1983 | 0.121545E+01 | -0.707633E-01 | 0.446460E-03 | 0.0 | 0.0 | 0.0 |
| 1984-1986 | 0.144386E+01 | -0.880857E-01 | 0.735680E-03 | 0.0 | 0.0 | 0.0 |
| 1987+ | 0.984090E+00 | -0.567319E-01 | 0.332820E-03 | 0.0 | 0.0 | 0.0 |
| CO | | | | | | |
| Pre-1970 | 0.233989E+01 | -0.296978E+00 | 0.160071E-01 | -0.477396E-03 | 0.706752E-05 | -0.403978E-07 |
| 1970-1973 | 0.277804E+01 | -0.319130E+00 | 0.153183E-01 | -0.422327E-03 | 0.584948E-05 | -0.314969E-07 |
| 1974-1978 | 0.283929E+01 | -0.368756E+00 | 0.210782E-01 | -0.676438E-03 | 0.106267E-04 | -0.636405E-07 |
| 1979-1983 | 0.116177E+01 | -0.592737E-01 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1984-1986 | 0.881952E+00 | -0.449976E-01 | 0.0 | 0.0 | 0.0 | 0.0 |
| 1987+ | 0.858419E+00 | -0.437969E-01 | 0.0 | 0.0 | 0.0 | 0.0 |
| NOx | | | | | | |
| Pre-1970 | 0.168635E+01 | -0.118303E+00 | 0.654975E-02 | -0.137139E-03 | 0.100849E-05 | 0.0 |
| 1970-1973 | 0.101743E+01 | -0.118958E-01 | 0.914365E-03 | -0.215740E-04 | 0.182300E-06 | 0.0 |
| 1974-1978 | 0.783838E+00 | 0.328549E-03 | 0.106029E-02 | -0.319350E-04 | 0.290389E-06 | 0.0 |
| 1979-1983 | 0.308282E+00 | -0.230362E-01 | 0.372830E-03 | 0.0 | 0.0 | 0.0 |
| 1984-1986 | 0.295046E+00 | -0.236333E-01 | 0.437750E-03 | 0.0 | 0.0 | 0.0 |
| 1987+ | 0.386041E+00 | -0.262961E-01 | 0.336740E-03 | 0.0 | 0.0 | 0.0 |

* WHERE : s = average speed (mph)
sadj = basic test procedure speed; adjusted for fraction of cold start operation x and fraction of hot start operation w, [ $1/sadj = (w+x)/26 + (1-w-x)/16$ ]

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TABLE 1.3.7A

## TEMPERATURE CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS II

* TCF(b) = EXP( TC(b) * (T - 75.0))

| Pol | Model Years | Test segment 1 TC Low | Test segment 1 TC High | Test segment 2 TC Low | Test segment 2 TC High | Test segment 3 TC Low | Test segment 3 TC High |
|---|---|---|---|---|---|---|---|
| HC | Pre-1970 | -0.20623E-01 | -0.14381E-01 | -0.24032E-02 | 0.13219E-02 | -0.10081E-02 | 0.34799E-02 |
| | 1970-1973 | -0.24462E-01 | -0.12552E-01 | -0.32017E-02 | 0.42667E-02 | -0.86884E-03 | 0.75843E-02 |
| | 1974-1978 | -0.21255E-01 | -0.10888E-01 | -0.52755E-03 | -0.47925E-03 | 0.93659E-03 | 0.76666E-02 |
| | 1979-1983 | -0.23517E-01 | -0.14095E-01 | -0.88057E-02 | 0.26179E-01 | -0.16222E-02 | 0.24297E-01 |
| | 1984-1987 | -0.27793E-01 | -0.14095E-01 | -0.10177E-01 | 0.26179E-01 | -0.82680E-02 | 0.24297E-01 |
| | 1988+ | -0.33883E-01 | 0.11959E-01 | -0.10113E-01 | -0.12627E-04 | -0.80650E-02 | 0.78765E-02 |
| CO | Pre-1970 | -0.13487E-01 | -0.14691E-01 | 0.15784E-02 | 0.37462E-02 | 0.11097E-02 | 0.11014E-01 |
| | 1970-1973 | -0.21126E-01 | -0.38767E-01 | -0.15289E-02 | 0.84685E-02 | 0.15749E-02 | 0.25179E-01 |
| | 1974-1978 | -0.20843E-01 | -0.21165E-01 | -0.59951E-02 | 0.23603E-01 | 0.18253E-02 | 0.28483E-01 |
| | 1979-1983 | -0.24835E-01 | -0.19612E-01 | -0.88336E-02 | 0.48537E-01 | -0.11553E-02 | 0.31439E-01 |
| | 1984-1987 | see NOTE 2 | -0.19612E-01 | -0.17783E-01 | 0.48537E-01 | -0.10871E-01 | 0.31439E-01 |
| | 1988+ | see NOTE 2 | -0.12596E-01 | -0.18813E-01 | 0.13861E-01 | -0.11951E-01 | 0.96939E-02 |
| NOx | Pre-1970 | -0.16897E-03 | 0.38841E-02 | -0.89245E-02 | -0.87325E-02 | -0.72580E-02 | -0.10839E-01 |
| | 1970-1973 | -0.25074E-03 | -0.10389E-02 | -0.59791E-02 | -0.92466E-02 | -0.62690E-02 | -0.10108E-01 |
| | 1974-1978 | 0.38855E-02 | -0.18301E-01 | -0.24156E-02 | -0.10925E-01 | -0.21188E-02 | -0.18042E-01 |
| | 1979-1987 | -0.76044E-02 | -0.26153E-01 | -0.68045E-02 | -0.18603E-01 | -0.54198E-02 | -0.20878E-01 |
| | 1988+ | -0.53710E-02 | -0.34416E-01 | -0.65050E-02 | -0.35871E-01 | -0.85650E-02 | -0.28830E-01 |

* WHERE :

TCF(b) = Temperature correction factor for appropriate pollutant, ambient temperature, and model year; for test segment b
T = Ambient temperature (Fahrenheit)
TC(b) = Temperature correction factor coefficient for appropriate pollutant, reference temperature and model year; for test segment b
75.0 = Reference temperature

NOTE 1 : The temperature correction factor is used in conjunction with the Ripstwxn correction factor given in Table 1.3.7B.

NOTE 2 : Offset model used for Bag 1 CO. Offset = -1.3812*(T - 75.0).

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## TABLE 1.3.7B

## NORMALIZED BAG FRACTIONS FOR
## LOW ALTITUDE
## LIGHT DUTY GASOLINE POWERED TRUCKS II

| | | Normalized Fractions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Model | Test Seg.#1 | | Test Seg.#2 | | Test Seg.#3 | | Total Test | |
| Pol | Years | B1 | D1 | B2 | D2 | B3 | D3 | B0 | D0 |
| HC | Pre-1970 | 1.282 | 0.025 | 0.973 | 0.028 | 0.839 | 0.019 | 1.000 | 0.025 |
| | 1970-1973 | 1.345 | 0.074 | 0.946 | 0.054 | 0.842 | 0.048 | 1.000 | 0.056 |
| | 1974-1978 | 1.398 | 0.060 | 0.885 | 0.055 | 0.919 | 0.036 | 1.000 | 0.051 |
| | 1979-1983 | 1.860 | 0.345 | 0.766 | 0.234 | 0.804 | 0.196 | 1.000 | 0.243 |
| | 1984-1986 | 2.200 | 0.714 | 0.571 | 0.171 | 0.914 | 0.143 | 1.000 | 0.286 |
| | 1987+ | 2.634 | 1.104 | 0.368 | 0.499 | 0.973 | 0.391 | 1.000 | 0.594 |
| CO | Pre-1970 | 1.277 | 0.033 | 1.017 | 0.029 | 0.758 | 0.025 | 1.000 | 0.029 |
| | 1970-1973 | 1.442 | 0.071 | 0.996 | 0.042 | 0.674 | 0.033 | 1.000 | 0.046 |
| | 1974-1978 | 1.573 | 0.054 | 0.902 | 0.079 | 0.755 | 0.029 | 1.000 | 0.060 |
| | 1979-1983 | 1.972 | 0.176 | 0.881 | 0.157 | 0.628 | 0.109 | 1.000 | 0.139 |
| | 1984-1986 | 2.438 | 0.282 | 0.658 | 0.062 | 0.621 | 0.077 | 1.000 | 0.111 |
| | 1987+ | 3.941 | 2.009 | 0.0 | 1.186 | 0.689 | 1.014 | 1.000 | 1.308 |
| NOx | Pre-1970 | 1.121 | 0.009 | 0.785 | 0.001 | 1.319 | -0.009 | 1.000 | 0.0 |
| | 1970-1973 | 1.199 | -0.004 | 0.793 | -0.002 | 1.245 | 0.006 | 1.000 | 0.0 |
| | 1974-1978 | 1.262 | 0.022 | 0.770 | 0.004 | 1.242 | 0.027 | 1.000 | 0.014 |
| | 1979-1986 | 1.372 | 0.040 | 0.766 | 0.046 | 1.167 | 0.063 | 1.000 | 0.051 |
| | 1987+ | 1.830 | 0.169 | 0.703 | 0.149 | 0.939 | 0.222 | 1.000 | 0.173 |

NOTE : The fractions given in this table are used in the calculation of the operating-mode/ temperature correction factor (OMTCF).

WHERE :
OMTCF = ((TERM1 + TERM2 + TERM3)/DENOM)
TERM1 = W *TCF(1)*(B1+D1*M)
TERM2 = (1-W-X)*TCF(2)*(B2+D2*M)
TERM3 = X *TCF(3)*(B3+D3*M)
DENOM = B0 + D0*M
W = Fraction of VMT in the cold start mode
X = Fraction of VMT in the hot start mode
TCF(b) = Temperature correction factor for pollutant, model year; for test segment b
M = Cumulative mileage / 10,000

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## TABLE 1.3.8A

## AIR CONDITIONING CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS II

* ACCF= U*V*(A + B*(T-75) -1) + 1

| Model Years | HC | | CO | | NOx | |
|---|---|---|---|---|---|---|
| | A | B | A | B | A | B |
| Pre-1979 | 0.1023E+01 | 0.3344E-02 | 0.1202E+01 | 0.1808E-02 | 0.1299E+01 | 0.5643E-04 |
| 1979+ | 0.1000E+01 | 0.3512E-02 | 0.1130E+01 | 0.1528E-02 | 0.1221E+01 | 0.4262E-03 |

* WHERE :

ACCF = Air Conditioning Correction Factor
V = Fraction of vehicles which are equipped with AC given in Table 1.3.8B
U = Fraction of vehicles with AC that are using it = (DI-DILO)/(DIHI-DI), 0<=U<=1
DI = Discomfort index = (DB+WB)*.4+15
DILO = The highest discomfort index where no AC is used
DIHI = The lowest discomfort index where all vehicles with AC use it
DB = Dry bulb temperature (Fahrenheit)
WB = Wet bulb temperature (Fahrenheit)
T = Ambient temperature (Fahrenheit)

## TABLE 1.3.8B

## ESTIMATED FRACTION OF LOW ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS II EQUIPPED WITH AIR CONDITIONING

| Model Years | Fraction Equipped With Air Conditioning |
|---|---|
| Pre-1977 | 0.32 |
| 1977 | 0.52 |
| 1978+ | 0.39 |

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## TABLE 1.3.9

## EXTRA LOAD CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS II

* XLCF = (XLC-1)*U + 1

| Model Years | Coefficients (XLC) HC | CO | NOx |
|---|---|---|---|
| Pre-1970 | 1.0786 | 1.2765 | 0.9535 |
| 1970-1973 | 1.0495 | 1.1384 | 1.0313 |
| 1974-1978 | 1.0556 | 1.1347 | 1.0753 |
| 1979+ | 1.0455 | 1.3058 | 1.0719 |

* WHERE :

XLCF = Extra load correction factor
U = Fraction of VMT with an extra load
XLC = Correction factor coefficient

## TABLE 1.3.10

## TRAILER TOWING CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS II

* TTCF = (TTC-1)*U + 1

| Model Years | Coefficients (TTC) HC | CO | NOx |
|---|---|---|---|
| Pre-1970 | 1.2614 | 1.9327 | 1.1184 |
| 1970-1973 | 1.2762 | 1.8940 | 1.1384 |
| 1974-1978 | 1.7288 | 2.1414 | 1.2170 |
| 1979+ | 1.5909 | 3.9722 | 1.3875 |

* WHERE :

TTCF = Trailer towing correction factor
U = Fraction of VMT towing a trailer
TTC = Correction factor coefficient

DATE : MAY 25, 1985

## TABLE 1.4.1A

## EXHAUST EMISSION RATES FOR
LOW ALTITUDE
HEAVY DUTY GASOLINE POWERED VEHICLES
(RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Mile) | Deterioration Rate (Gm/Mi/10K Mi) | 50,000 Mile Emission Level (Grams/Mile) |
|---|---|---|---|---|
| HC | Pre-1963 | 16.49 | 0.31 | 18.04 |
| | 1963-1969 | 17.08 | 0.32 | 18.68 |
| | 1970-1973 | 9.21 | 0.37 | 11.06 |
| | 1974-1977 | 8.28 | 0.22 | 9.38 |
| | 1978 | 7.31 | 0.19 | 8.26 |
| | 1979-1980 | 3.07 | 0.19 | 4.02 |
| | 1981-1982 | 2.86 | 0.17 | 3.71 |
| | 1983 | 2.83 | 0.17 | 3.68 |
| | 1984 | 2.84 | 0.17 | 3.69 |
| | 1985 | 2.45 | 0.06 | 2.75 |
| | 1986 | 2.16 | 0.06 | 2.46 |
| | 1987-1990 | 0.97 | 0.09 | 1.42 |
| | 1991-1993 | 0.95 | 0.08 | 1.35 |
| | 1994-1996 | 0.93 | 0.08 | 1.33 |
| | 1997+ | 0.91 | 0.08 | 1.31 |
| CO | Pre-1963 | 200.80 | 4.81 | 224.85 |
| | 1963-1969 | 208.10 | 4.99 | 233.05 |
| | 1970-1973 | 157.48 | 6.68 | 190.88 |
| | 1974-1977 | 141.48 | 5.74 | 170.18 |
| | 1978 | 124.90 | 5.07 | 150.25 |
| | 1979-1980 | 104.78 | 4.83 | 128.93 |
| | 1981-1982 | 97.71 | 4.50 | 120.21 |
| | 1983 | 96.53 | 4.45 | 118.78 |
| | 1984 | 97.15 | 4.47 | 119.50 |
| | 1985 | 38.30 | 0.92 | 42.90 |
| | 1986 | 30.45 | 0.93 | 35.10 |
| | 1987-1990 | 13.26 | 0.58 | 16.16 |
| | 1991-1993 | 12.98 | 0.57 | 15.83 |
| | 1994-1996 | 12.63 | 0.55 | 15.38 |
| | 1997+ | 12.39 | 0.54 | 15.09 |
| NOx | Pre-1963 | 7.87 | 0.0 | 7.87 |
| | 1963-1969 | 8.15 | 0.0 | 8.15 |
| | 1970-1973 | 9.35 | 0.0 | 9.35 |
| | 1974-1977 | 6.12 | 0.07 | 6.47 |
| | 1978 | 5.41 | 0.06 | 5.71 |
| | 1979-1980 | 5.14 | 0.06 | 5.44 |
| | 1981-1982 | 4.80 | 0.06 | 5.10 |
| | 1983 | 4.74 | 0.06 | 5.04 |
| | 1984 | 4.77 | 0.06 | 5.07 |
| | 1985 | 4.79 | 0.03 | 4.94 |
| | 1986 | 4.82 | 0.03 | 4.97 |
| | 1987-1990 | 4.60 | 0.10 | 5.10 |
| | 1991-1993 | 4.50 | 0.09 | 4.95 |
| | 1994-1996 | 4.38 | 0.09 | 4.83 |
| | 1997+ | 4.30 | 0.09 | 4.75 |

* WHERE : BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

DATE : MAY 25, 1985

## TABLE 1.4.1B

### EXHAUST EMISSION RATES FOR
### LOW ALTITUDE
### HEAVY DUTY GASOLINE POWERED VEHICLES
### AT VARIOUS MILEAGE INTERVALS
### (RATES INCLUDE TAMPERING)

| Pol | Model Years | Emission Rate (Grams/Mile) 0K | 20K | 40K | 60K | 80K | 100K | 120K | 140K |
|---|---|---|---|---|---|---|---|---|---|
| HC | Pre-1963 | 16.49 | 17.11 | 17.73 | 18.35 | 18.97 | 19.59 | 20.21 | 20.83 |
| | 1963-1969 | 17.08 | 17.72 | 18.36 | 19.00 | 19.64 | 20.28 | 20.92 | 21.56 |
| | 1970-1973 | 9.21 | 9.95 | 10.69 | 11.43 | 12.17 | 12.91 | 13.65 | 14.39 |
| | 1974-1977 | 8.28 | 8.72 | 9.16 | 9.60 | 10.04 | 10.48 | 10.92 | 11.36 |
| | 1978 | 7.31 | 7.69 | 8.07 | 8.45 | 8.83 | 9.21 | 9.59 | 9.97 |
| | 1979-1980 | 3.07 | 3.45 | 3.83 | 4.21 | 4.59 | 4.97 | 5.35 | 5.73 |
| | 1981-1982 | 2.86 | 3.20 | 3.54 | 3.88 | 4.22 | 4.56 | 4.90 | 5.24 |
| | 1983 | 2.83 | 3.17 | 3.51 | 3.85 | 4.19 | 4.53 | 4.87 | 5.21 |
| | 1984 | 2.84 | 3.18 | 3.52 | 3.86 | 4.20 | 4.54 | 4.88 | 5.22 |
| | 1985 | 2.45 | 2.57 | 2.69 | 2.81 | 2.93 | 3.05 | 3.17 | 3.29 |
| | 1986 | 2.16 | 2.28 | 2.40 | 2.52 | 2.64 | 2.76 | 2.88 | 3.00 |
| | 1987-1990 | 1.42 | 1.73 | 2.05 | 2.37 | 2.68 | 3.00 | 3.32 | 3.64 |
| | 1991-1993 | 1.40 | 1.69 | 1.99 | 2.29 | 2.58 | 2.88 | 3.18 | 3.48 |
| | 1994-1996 | 1.38 | 1.67 | 1.97 | 2.27 | 2.56 | 2.86 | 3.16 | 3.46 |
| | 1997+ | 1.36 | 1.65 | 1.95 | 2.25 | 2.54 | 2.84 | 3.14 | 3.44 |
| CO | Pre-1963 | 200.80 | 210.42 | 220.04 | 229.66 | 239.28 | 248.90 | 258.52 | 268.14 |
| | 1963-1969 | 208.10 | 218.08 | 228.06 | 238.04 | 248.02 | 258.00 | 267.98 | 277.96 |
| | 1970-1973 | 157.48 | 170.84 | 184.20 | 197.56 | 210.92 | 224.28 | 237.64 | 251.00 |
| | 1974-1977 | 141.48 | 152.96 | 164.44 | 175.92 | 187.40 | 198.88 | 210.36 | 221.84 |
| | 1978 | 124.90 | 135.04 | 145.18 | 155.32 | 165.46 | 175.60 | 185.74 | 195.88 |
| | 1979-1980 | 104.78 | 114.44 | 124.10 | 133.76 | 143.42 | 153.08 | 162.74 | 172.40 |
| | 1981-1982 | 97.71 | 106.71 | 115.71 | 124.71 | 133.71 | 142.71 | 151.71 | 160.71 |
| | 1983 | 96.53 | 105.43 | 114.33 | 123.23 | 132.13 | 141.03 | 149.93 | 158.83 |
| | 1984 | 97.15 | 106.09 | 115.03 | 123.97 | 132.91 | 141.85 | 150.79 | 159.73 |
| | 1985 | 38.30 | 40.14 | 41.98 | 43.82 | 45.66 | 47.50 | 49.34 | 51.18 |
| | 1986 | 30.45 | 32.31 | 34.17 | 36.03 | 37.89 | 39.75 | 41.61 | 43.47 |
| | 1987-1990 | 17.25 | 19.82 | 22.40 | 24.98 | 27.56 | 30.14 | 32.72 | 35.30 |
| | 1991-1993 | 16.97 | 19.52 | 22.08 | 24.64 | 27.20 | 29.76 | 32.32 | 34.88 |
| | 1994-1996 | 16.62 | 19.13 | 21.65 | 24.17 | 26.69 | 29.21 | 31.73 | 34.25 |
| | 1997+ | 16.38 | 18.87 | 21.37 | 23.87 | 26.37 | 28.87 | 31.37 | 33.87 |
| NOx | Pre-1963 | 7.87 | 7.87 | 7.87 | 7.87 | 7.87 | 7.87 | 7.87 | 7.87 |
| | 1963-1969 | 8.15 | 8.15 | 8.15 | 8.15 | 8.15 | 8.15 | 8.15 | 8.15 |
| | 1970-1973 | 9.35 | 9.35 | 9.35 | 9.35 | 9.35 | 9.35 | 9.35 | 9.35 |
| | 1974-1977 | 6.12 | 6.26 | 6.40 | 6.54 | 6.68 | 6.82 | 6.96 | 7.10 |
| | 1978 | 5.41 | 5.53 | 5.65 | 5.77 | 5.89 | 6.01 | 6.13 | 6.25 |
| | 1979-1980 | 5.14 | 5.26 | 5.38 | 5.50 | 5.62 | 5.74 | 5.86 | 5.98 |
| | 1981-1982 | 4.80 | 4.92 | 5.04 | 5.16 | 5.28 | 5.40 | 5.52 | 5.64 |
| | 1983 | 4.74 | 4.86 | 4.98 | 5.10 | 5.22 | 5.34 | 5.46 | 5.58 |
| | 1984 | 4.77 | 4.89 | 5.01 | 5.13 | 5.25 | 5.37 | 5.49 | 5.61 |
| | 1985 | 4.79 | 4.85 | 4.91 | 4.97 | 5.03 | 5.09 | 5.15 | 5.21 |
| | 1986 | 4.82 | 4.88 | 4.94 | 5.00 | 5.06 | 5.12 | 5.18 | 5.24 |
| | 1987-1990 | 4.77 | 5.11 | 5.46 | 5.80 | 6.15 | 6.49 | 6.84 | 7.18 |
| | 1991-1993 | 4.67 | 4.99 | 5.32 | 5.64 | 5.97 | 6.29 | 6.62 | 6.94 |
| | 1994-1996 | 4.55 | 4.87 | 5.20 | 5.52 | 5.85 | 6.17 | 6.50 | 6.82 |
| | 1997+ | 4.47 | 4.79 | 5.12 | 5.44 | 5.77 | 6.09 | 6.42 | 6.74 |

DATE : MAY 25, 1985

## TABLE 1.4.1C

### CRANKCASE AND EVAPORATIVE HYDROCARBON EMISSIONS FOR LOW ALTITUDE HEAVY DUTY GASOLINE POWERED VEHICLES (RATES REFLECT ZERO TAMPERING)

** CCEV = (HSK * TPD + DNL)/MPD + CC

| Model Years | SHED Hot Soak Emissions (Gm/Trip) | Trips* Per Day | SHED Diurnal Emissions (Gm/Day) | Miles* Per Day | Crankcase Emissions (Gm/Mile) | Total Crankcase and Evap. Emissions (Gm/Mile) |
|---|---|---|---|---|---|---|
| Pre-1968 | 27.66 | 6.88 | 77.89 | 36.70 | 5.70 | 13.01 |
| 1968-1984 | 27.66 | 6.88 | 77.89 | 36.70 | 0.0 | 7.31 |
| 1985+ | 6.34 | 6.88 | 14.83 | 36.70 | 0.0 | 1.59 |

* Default information that may be altered by the MOBILE3 user with information about the local area.

** WHERE :

CCEV = Total untampered crankcase & evaporative HC emissions (Gm/Mile)
HSK = Hot soak emissions (Gm/Trip)
TPD = Trips per day
DNL = Diurnal emissions (Gm/Day)
MPD = Miles per day
CC = Crankcase emissions (Gm/Mile)

DATE : MAY 25, 1985

## TABLE 1.4.1D

## TOTAL CRANKCASE AND EVAPORATIVE HC EMISSIONS FOR LOW ALTITUDE HEAVY DUTY GASOLINE POWERED VEHICLES AT VARIOUS MILEAGE INTERVALS (RATES INCLUDE TAMPERING)

| Model Years | Emission Rate (Grams/Mile) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 0K | 20K | 40K | 60K | 80K | 100K | 120K | 140K |
| Pre-1968 | 13.01 | 13.01 | 13.01 | 13.01 | 13.01 | 13.01 | 13.01 | 13.01 |
| 1968-1984 | 7.48 | 7.51 | 7.54 | 7.57 | 7.60 | 7.62 | 7.65 | 7.68 |
| 1985+ | 1.92 | 1.97 | 2.03 | 2.08 | 2.14 | 2.19 | 2.24 | 2.30 |

DATE : MAY 25, 1985

## TABLE 1.4.2A

### EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
### HEAVY DUTY GASOLINE POWERED VEHICLES
### TOTAL HC (INCLUDES EVAP & CRANKCASE)

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 35.0 | 1962 | 35.0 | 1963 | 36.2 | 1964 | 36.2 | 1965 | 36.2 | 1966 | 36.2 | 1967 | 36.2 | 1968 | 30.5 | 1969 | 30.5 | 1970 | 23.5 | 1971 | 23.5 | 1972 | 23.5 |
| 1962 | 34.9 | 1963 | 36.1 | 1964 | 36.1 | 1965 | 36.1 | 1966 | 36.1 | 1967 | 36.1 | 1968 | 30.4 | 1969 | 30.4 | 1970 | 23.4 | 1971 | 23.4 | 1972 | 23.4 | 1973 | 23.4 |
| 1963 | 35.9 | 1964 | 35.9 | 1965 | 35.9 | 1966 | 35.9 | 1967 | 35.9 | 1968 | 30.2 | 1969 | 30.2 | 1970 | 23.2 | 1971 | 23.2 | 1972 | 23.2 | 1973 | 23.2 | 1974 | 19.7 |
| 1964 | 35.8 | 1965 | 35.8 | 1966 | 35.8 | 1967 | 35.8 | 1968 | 30.1 | 1969 | 30.1 | 1970 | 23.1 | 1971 | 23.1 | 1972 | 23.1 | 1973 | 23.1 | 1974 | 19.6 | 1975 | 19.6 |
| 1965 | 35.7 | 1966 | 35.7 | 1967 | 35.7 | 1968 | 30.0 | 1969 | 30.0 | 1970 | 22.9 | 1971 | 22.9 | 1972 | 22.9 | 1973 | 22.9 | 1974 | 19.5 | 1975 | 19.5 | 1976 | 19.5 |
| 1966 | 35.5 | 1967 | 35.5 | 1968 | 29.8 | 1969 | 29.8 | 1970 | 22.7 | 1971 | 22.7 | 1972 | 22.7 | 1973 | 22.7 | 1974 | 19.4 | 1975 | 19.4 | 1976 | 19.4 | 1977 | 19.4 |
| 1967 | 35.3 | 1968 | 29.6 | 1969 | 29.6 | 1970 | 22.5 | 1971 | 22.5 | 1972 | 22.5 | 1973 | 22.5 | 1974 | 19.3 | 1975 | 19.3 | 1976 | 19.3 | 1977 | 19.3 | 1978 | 17.9 |
| 1968 | 29.4 | 1969 | 29.4 | 1970 | 22.2 | 1971 | 22.2 | 1972 | 22.2 | 1973 | 22.2 | 1974 | 19.2 | 1975 | 19.2 | 1976 | 19.2 | 1977 | 19.2 | 1978 | 17.7 | 1979 | 13.5 |
| 1969 | 29.2 | 1970 | 22.0 | 1971 | 22.0 | 1972 | 22.0 | 1973 | 22.0 | 1974 | 19.0 | 1975 | 19.0 | 1976 | 19.0 | 1977 | 19.0 | 1978 | 17.6 | 1979 | 13.4 | 1980 | 13.4 |
| 1970 | 21.7 | 1971 | 21.7 | 1972 | 21.7 | 1973 | 21.7 | 1974 | 18.8 | 1975 | 18.8 | 1976 | 18.8 | 1977 | 18.8 | 1978 | 17.5 | 1979 | 13.2 | 1980 | 13.2 | 1981 | 12.7 |
| 1971 | 21.4 | 1972 | 21.4 | 1973 | 21.4 | 1974 | 18.6 | 1975 | 18.6 | 1976 | 18.6 | 1977 | 18.6 | 1978 | 17.3 | 1979 | 13.1 | 1980 | 13.1 | 1981 | 12.6 | 1982 | 12.6 |
| 1972 | 21.0 | 1973 | 21.0 | 1974 | 18.4 | 1975 | 18.4 | 1976 | 18.4 | 1977 | 18.4 | 1978 | 17.1 | 1979 | 12.9 | 1980 | 12.9 | 1981 | 12.4 | 1982 | 12.4 | 1983 | 12.4 |
| 1973 | 20.6 | 1974 | 18.2 | 1975 | 18.2 | 1976 | 18.2 | 1977 | 18.2 | 1978 | 16.9 | 1979 | 12.7 | 1980 | 12.7 | 1981 | 12.3 | 1982 | 12.3 | 1983 | 12.2 | 1984 | 12.2 |
| 1974 | 17.9 | 1975 | 17.9 | 1976 | 17.9 | 1977 | 17.9 | 1978 | 16.7 | 1979 | 12.5 | 1980 | 12.5 | 1981 | 12.1 | 1982 | 12.1 | 1983 | 12.0 | 1984 | 12.0 | 1985 | 4.9 |
| 1975 | 17.7 | 1976 | 17.7 | 1977 | 17.7 | 1978 | 16.5 | 1979 | 12.2 | 1980 | 12.2 | 1981 | 11.8 | 1982 | 11.8 | 1983 | 11.8 | 1984 | 11.8 | 1985 | 4.9 | 1986 | 4.6 |
| 1976 | 17.4 | 1977 | 17.4 | 1978 | 16.2 | 1979 | 11.9 | 1980 | 11.9 | 1981 | 11.6 | 1982 | 11.6 | 1983 | 11.6 | 1984 | 11.6 | 1985 | 4.8 | 1986 | 4.5 | 1987 | 3.5 |
| 1977 | 17.0 | 1978 | 15.9 | 1979 | 11.7 | 1980 | 11.7 | 1981 | 11.3 | 1982 | 11.3 | 1983 | 11.3 | 1984 | 11.3 | 1985 | 4.7 | 1986 | 4.4 | 1987 | 3.3 | 1988 | 3.3 |
| 1978 | 15.6 | 1979 | 11.3 | 1980 | 11.3 | 1981 | 11.0 | 1982 | 11.0 | 1983 | 11.0 | 1984 | 11.0 | 1985 | 4.6 | 1986 | 4.3 | 1987 | 3.2 | 1988 | 3.2 | 1989 | 3.2 |
| 1979 | 11.0 | 1980 | 11.0 | 1981 | 10.7 | 1982 | 10.7 | 1983 | 10.7 | 1984 | 10.7 | 1985 | 4.5 | 1986 | 4.2 | 1987 | 3.0 | 1988 | 3.0 | 1989 | 3.0 | 1990 | 3.0 |
| 1980 | 10.8 | 1981 | 10.6 | 1982 | 10.6 | 1983 | 10.5 | 1984 | 10.5 | 1985 | 4.4 | 1986 | 4.1 | 1987 | 2.9 | 1988 | 2.9 | 1989 | 2.9 | 1990 | 2.9 | 1991 | 2.9 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 23.5 | 1974 | 19.9 | 1975 | 19.9 | 1976 | 19.9 | 1977 | 19.9 | 1978 | 18.4 | 1979 | 14.1 | 1980 | 14.1 | 1981 | 13.6 | 1982 | 13.6 | 1983 | 13.5 | 1984 | 13.5 |
| 1974 | 19.8 | 1975 | 19.8 | 1976 | 19.8 | 1977 | 19.8 | 1978 | 18.3 | 1979 | 14.1 | 1980 | 14.1 | 1981 | 13.5 | 1982 | 13.5 | 1983 | 13.5 | 1984 | 13.5 | 1985 | 5.4 |
| 1975 | 19.7 | 1976 | 19.7 | 1977 | 19.7 | 1978 | 18.3 | 1979 | 14.0 | 1980 | 14.0 | 1981 | 13.4 | 1982 | 13.4 | 1983 | 13.4 | 1984 | 13.4 | 1985 | 5.4 | 1986 | 5.1 |
| 1976 | 19.6 | 1977 | 19.6 | 1978 | 18.2 | 1979 | 13.9 | 1980 | 13.9 | 1981 | 13.4 | 1982 | 13.4 | 1983 | 13.3 | 1984 | 13.3 | 1985 | 5.4 | 1986 | 5.1 | 1987 | 4.4 |
| 1977 | 19.5 | 1978 | 18.1 | 1979 | 13.8 | 1980 | 13.8 | 1981 | 13.3 | 1982 | 13.3 | 1983 | 13.3 | 1984 | 13.3 | 1985 | 5.4 | 1986 | 5.1 | 1987 | 4.3 | 1988 | 4.3 |
| 1978 | 18.0 | 1979 | 13.7 | 1980 | 13.7 | 1981 | 13.2 | 1982 | 13.2 | 1983 | 13.2 | 1984 | 13.2 | 1985 | 5.3 | 1986 | 5.0 | 1987 | 4.3 | 1988 | 4.3 | 1989 | 4.3 |
| 1979 | 13.6 | 1980 | 13.6 | 1981 | 13.1 | 1982 | 13.1 | 1983 | 13.1 | 1984 | 13.1 | 1985 | 5.3 | 1986 | 5.0 | 1987 | 4.2 | 1988 | 4.2 | 1989 | 4.2 | 1990 | 4.2 |
| 1980 | 13.5 | 1981 | 13.0 | 1982 | 13.0 | 1983 | 13.0 | 1984 | 13.0 | 1985 | 5.3 | 1986 | 5.0 | 1987 | 4.2 | 1988 | 4.2 | 1989 | 4.2 | 1990 | 4.2 | 1991 | 4.0 |
| 1981 | 12.9 | 1982 | 12.9 | 1983 | 12.8 | 1984 | 12.8 | 1985 | 5.2 | 1986 | 4.9 | 1987 | 4.1 | 1988 | 4.1 | 1989 | 4.1 | 1990 | 4.1 | 1991 | 4.0 | 1992 | 4.0 |
| 1982 | 12.7 | 1983 | 12.7 | 1984 | 12.7 | 1985 | 5.2 | 1986 | 4.9 | 1987 | 4.1 | 1988 | 4.1 | 1989 | 4.1 | 1990 | 4.1 | 1991 | 3.9 | 1992 | 3.9 | 1993 | 3.9 |
| 1983 | 12.6 | 1984 | 12.6 | 1985 | 5.1 | 1986 | 4.8 | 1987 | 4.0 | 1988 | 4.0 | 1989 | 4.0 | 1990 | 4.0 | 1991 | 3.8 | 1992 | 3.8 | 1993 | 3.8 | 1994 | 3.8 |
| 1984 | 12.4 | 1985 | 5.1 | 1986 | 4.8 | 1987 | 3.9 | 1988 | 3.9 | 1989 | 3.9 | 1990 | 3.9 | 1991 | 3.7 | 1992 | 3.7 | 1993 | 3.7 | 1994 | 3.7 | 1995 | 3.7 |
| 1985 | 5.0 | 1986 | 4.7 | 1987 | 3.8 | 1988 | 3.8 | 1989 | 3.8 | 1990 | 3.8 | 1991 | 3.7 | 1992 | 3.7 | 1993 | 3.7 | 1994 | 3.6 | 1995 | 3.6 | 1996 | 3.6 |
| 1986 | 4.6 | 1987 | 3.7 | 1988 | 3.7 | 1989 | 3.7 | 1990 | 3.7 | 1991 | 3.6 | 1992 | 3.6 | 1993 | 3.6 | 1994 | 3.5 | 1995 | 3.5 | 1996 | 3.5 | 1997 | 3.5 |
| 1987 | 3.6 | 1988 | 3.6 | 1989 | 3.6 | 1990 | 3.6 | 1991 | 3.5 | 1992 | 3.5 | 1993 | 3.5 | 1994 | 3.4 | 1995 | 3.4 | 1996 | 3.4 | 1997 | 3.4 | 1998 | 3.4 |
| 1988 | 3.5 | 1989 | 3.5 | 1990 | 3.5 | 1991 | 3.4 | 1992 | 3.4 | 1993 | 3.4 | 1994 | 3.3 | 1995 | 3.3 | 1996 | 3.3 | 1997 | 3.3 | 1998 | 3.3 | 1999 | 3.3 |
| 1989 | 3.3 | 1990 | 3.3 | 1991 | 3.2 | 1992 | 3.2 | 1993 | 3.2 | 1994 | 3.2 | 1995 | 3.2 | 1996 | 3.2 | 1997 | 3.2 | 1998 | 3.2 | 1999 | 3.2 | 2000 | 3.2 |
| 1990 | 3.2 | 1991 | 3.1 | 1992 | 3.1 | 1993 | 3.1 | 1994 | 3.1 | 1995 | 3.1 | 1996 | 3.1 | 1997 | 3.0 | 1998 | 3.0 | 1999 | 3.0 | 2000 | 3.0 | 2001 | 3.0 |
| 1991 | 2.9 | 1992 | 2.9 | 1993 | 2.9 | 1994 | 2.9 | 1995 | 2.9 | 1996 | 2.9 | 1997 | 2.9 | 1998 | 2.9 | 1999 | 2.9 | 2000 | 2.9 | 2001 | 2.9 | 2002 | 2.9 |
| 1992 | 2.9 | 1993 | 2.9 | 1994 | 2.8 | 1995 | 2.8 | 1996 | 2.8 | 1997 | 2.8 | 1998 | 2.8 | 1999 | 2.8 | 2000 | 2.8 | 2001 | 2.8 | 2002 | 2.8 | 2003 | 2.8 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F. Emissions are based on the January 1 mileage accumulation figures given in Table 1.4.4.

TABLE 1.4.2B DATE : MAY 25, 1985

# EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
# HEAVY DUTY GASOLINE POWERED VEHICLES
# CO

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 286.1 | 1962 | 286.1 | 1963 | 296.6 | 1964 | 296.6 | 1965 | 296.6 | 1966 | 296.6 | 1967 | 296.6 | 1968 | 296.6 | 1969 | 296.6 | 1970 | 276.0 | 1971 | 276.0 | 1972 | 276.0 |
| 1962 | 284.4 | 1963 | 294.8 | 1964 | 294.8 | 1965 | 294.8 | 1966 | 294.8 | 1967 | 294.8 | 1968 | 294.8 | 1969 | 294.8 | 1970 | 273.6 | 1971 | 273.6 | 1972 | 273.6 | 1973 | 273.6 |
| 1963 | 292.9 | 1964 | 292.9 | 1965 | 292.9 | 1966 | 292.9 | 1967 | 292.9 | 1968 | 292.9 | 1969 | 292.9 | 1970 | 271.0 | 1971 | 271.0 | 1972 | 271.0 | 1973 | 271.0 | 1974 | 239.0 |
| 1964 | 290.8 | 1965 | 290.8 | 1966 | 290.8 | 1967 | 290.8 | 1968 | 290.8 | 1969 | 290.8 | 1970 | 268.2 | 1971 | 268.2 | 1972 | 268.2 | 1973 | 268.2 | 1974 | 236.6 | 1975 | 236.6 |
| 1965 | 288.4 | 1966 | 288.4 | 1967 | 288.4 | 1968 | 288.4 | 1969 | 288.4 | 1970 | 265.0 | 1971 | 265.0 | 1972 | 265.0 | 1973 | 265.0 | 1974 | 233.9 | 1975 | 233.9 | 1976 | 233.9 |
| 1966 | 285.8 | 1967 | 285.8 | 1968 | 285.8 | 1969 | 285.8 | 1970 | 261.5 | 1971 | 261.5 | 1972 | 261.5 | 1973 | 261.5 | 1974 | 230.9 | 1975 | 230.9 | 1976 | 230.9 | 1977 | 230.9 |
| 1967 | 282.9 | 1968 | 282.9 | 1969 | 282.9 | 1970 | 257.7 | 1971 | 257.7 | 1972 | 257.7 | 1973 | 257.7 | 1974 | 227.6 | 1975 | 227.6 | 1976 | 227.6 | 1977 | 227.6 | 1978 | 200.9 |
| 1968 | 279.8 | 1969 | 279.8 | 1970 | 253.4 | 1971 | 253.4 | 1972 | 253.4 | 1973 | 253.4 | 1974 | 223.9 | 1975 | 223.9 | 1976 | 223.9 | 1977 | 223.9 | 1978 | 197.7 | 1979 | 174.1 |
| 1969 | 276.3 | 1970 | 248.7 | 1971 | 248.7 | 1972 | 248.7 | 1973 | 248.7 | 1974 | 219.9 | 1975 | 219.9 | 1976 | 219.9 | 1977 | 219.9 | 1978 | 194.1 | 1979 | 170.7 | 1980 | 170.7 |
| 1970 | 243.5 | 1971 | 243.5 | 1972 | 243.5 | 1973 | 243.5 | 1974 | 215.4 | 1975 | 215.4 | 1976 | 215.4 | 1977 | 215.4 | 1978 | 190.2 | 1979 | 167.0 | 1980 | 167.0 | 1981 | 155.7 |
| 1971 | 237.8 | 1972 | 237.8 | 1973 | 237.8 | 1974 | 210.5 | 1975 | 210.5 | 1976 | 210.5 | 1977 | 210.5 | 1978 | 185.9 | 1979 | 162.9 | 1980 | 162.9 | 1981 | 151.8 | 1982 | 151.8 |
| 1972 | 231.5 | 1973 | 231.5 | 1974 | 205.0 | 1975 | 205.0 | 1976 | 205.0 | 1977 | 205.0 | 1978 | 181.0 | 1979 | 158.3 | 1980 | 158.3 | 1981 | 147.5 | 1982 | 147.5 | 1983 | 145.8 |
| 1973 | 224.5 | 1974 | 199.0 | 1975 | 199.0 | 1976 | 199.0 | 1977 | 199.0 | 1978 | 175.7 | 1979 | 153.2 | 1980 | 153.2 | 1981 | 142.8 | 1982 | 142.8 | 1983 | 141.2 | 1984 | 142.0 |
| 1974 | 192.4 | 1975 | 192.4 | 1976 | 192.4 | 1977 | 192.4 | 1978 | 169.9 | 1979 | 147.6 | 1980 | 147.6 | 1981 | 137.6 | 1982 | 137.6 | 1983 | 136.0 | 1984 | 136.8 | 1985 | 46.5 |
| 1975 | 185.1 | 1976 | 185.1 | 1977 | 185.1 | 1978 | 163.4 | 1979 | 141.5 | 1980 | 141.5 | 1981 | 131.9 | 1982 | 131.9 | 1983 | 130.3 | 1984 | 131.1 | 1985 | 45.3 | 1986 | 37.5 |
| 1976 | 177.0 | 1977 | 177.0 | 1978 | 156.2 | 1979 | 134.6 | 1980 | 134.6 | 1981 | 125.5 | 1982 | 125.5 | 1983 | 124.0 | 1984 | 124.8 | 1985 | 44.0 | 1986 | 36.2 | 1987 | 16.8 |
| 1977 | 168.0 | 1978 | 148.3 | 1979 | 127.1 | 1980 | 127.1 | 1981 | 118.5 | 1982 | 118.5 | 1983 | 117.1 | 1984 | 117.8 | 1985 | 42.6 | 1986 | 34.7 | 1987 | 15.9 | 1988 | 15.9 |
| 1978 | 139.6 | 1979 | 118.8 | 1980 | 118.8 | 1981 | 110.8 | 1982 | 110.8 | 1983 | 109.4 | 1984 | 110.1 | 1985 | 41.0 | 1986 | 33.1 | 1987 | 14.9 | 1988 | 14.9 | 1989 | 14.9 |
| 1979 | 109.6 | 1980 | 109.6 | 1981 | 102.2 | 1982 | 102.2 | 1983 | 101.0 | 1984 | 101.6 | 1985 | 39.2 | 1986 | 31.4 | 1987 | 13.8 | 1988 | 13.8 | 1989 | 13.8 | 1990 | 13.8 |
| 1980 | 104.8 | 1981 | 97.7 | 1982 | 97.7 | 1983 | 96.5 | 1984 | 97.1 | 1985 | 38.3 | 1986 | 30.4 | 1987 | 13.3 | 1988 | 13.3 | 1989 | 13.3 | 1990 | 13.3 | 1991 | 13.0 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 276.0 | 1974 | 243.3 | 1975 | 243.3 | 1976 | 243.3 | 1977 | 243.3 | 1978 | 214.8 | 1979 | 190.4 | 1980 | 190.4 | 1981 | 177.5 | 1982 | 177.5 | 1983 | 175.5 | 1984 | 176.4 |
| 1974 | 241.3 | 1975 | 241.3 | 1976 | 241.3 | 1977 | 241.3 | 1978 | 213.0 | 1979 | 188.7 | 1980 | 188.7 | 1981 | 175.9 | 1982 | 175.9 | 1983 | 173.9 | 1984 | 174.9 | 1985 | 54.3 |
| 1975 | 239.0 | 1976 | 239.0 | 1977 | 239.0 | 1978 | 211.1 | 1979 | 186.9 | 1980 | 186.9 | 1981 | 174.2 | 1982 | 174.2 | 1983 | 172.2 | 1984 | 173.1 | 1985 | 53.9 | 1986 | 46.3 |
| 1976 | 236.6 | 1977 | 236.6 | 1978 | 208.9 | 1979 | 184.8 | 1980 | 184.8 | 1981 | 172.3 | 1982 | 172.3 | 1983 | 170.3 | 1984 | 171.2 | 1985 | 53.5 | 1986 | 45.9 | 1987 | 22.[illegible] |
| 1977 | 233.9 | 1978 | 206.5 | 1979 | 182.5 | 1980 | 182.5 | 1981 | 170.1 | 1982 | 170.1 | 1983 | 168.2 | 1984 | 169.1 | 1985 | 53.1 | 1986 | 45.4 | 1987 | 22.6 | 1988 | 22.6 |
| 1978 | 203.9 | 1979 | 180.0 | 1980 | 180.0 | 1981 | 167.8 | 1982 | 167.8 | 1983 | 165.8 | 1984 | 166.8 | 1985 | 52.6 | 1986 | 44.9 | 1987 | 22.3 | 1988 | 22.3 | 1989 | 22.3 |
| 1979 | 177.2 | 1980 | 177.2 | 1981 | 165.2 | 1982 | 165.2 | 1983 | 163.3 | 1984 | 164.2 | 1985 | 52.1 | 1986 | 44.4 | 1987 | 22.0 | 1988 | 22.0 | 1989 | 22.0 | 1990 | 22.0 |
| 1980 | 174.1 | 1981 | 162.3 | 1982 | 162.3 | 1983 | 160.4 | 1984 | 161.3 | 1985 | 51.5 | 1986 | 43.8 | 1987 | 21.6 | 1988 | 21.6 | 1989 | 21.6 | 1990 | 21.6 | 1991 | 21.2 |
| 1981 | 159.2 | 1982 | 159.2 | 1983 | 157.3 | 1984 | 158.2 | 1985 | 50.9 | 1986 | 43.2 | 1987 | 21.2 | 1988 | 21.2 | 1989 | 21.2 | 1990 | 21.2 | 1991 | 20.8 | 1992 | 20.8 |
| 1982 | 155.7 | 1983 | 153.9 | 1984 | 154.7 | 1985 | 50.2 | 1986 | 42.4 | 1987 | 20.7 | 1988 | 20.7 | 1989 | 20.7 | 1990 | 20.7 | 1991 | 20.3 | 1992 | 20.3 | 1993 | 20.3 |
| 1983 | 150.0 | 1984 | 150.9 | 1985 | 49.4 | 1986 | 41.6 | 1987 | 20.2 | 1988 | 20.2 | 1989 | 20.2 | 1990 | 20.2 | 1991 | 19.8 | 1992 | 19.8 | 1993 | 19.8 | 1994 | 19.2 |
| 1984 | 146.7 | 1985 | 48.5 | 1986 | 40.7 | 1987 | 19.7 | 1988 | 19.7 | 1989 | 19.7 | 1990 | 19.7 | 1991 | 19.3 | 1992 | 19.3 | 1993 | 19.3 | 1994 | 18.7 | 1995 | 18.7 |
| 1985 | 47.5 | 1986 | 39.8 | 1987 | 19.1 | 1988 | 19.1 | 1989 | 19.1 | 1990 | 19.1 | 1991 | 18.7 | 1992 | 18.7 | 1993 | 18.7 | 1994 | 18.1 | 1995 | 18.1 | 1996 | 18.1 |
| 1986 | 38.7 | 1987 | 18.4 | 1988 | 18.4 | 1989 | 18.4 | 1990 | 18.4 | 1991 | 18.0 | 1992 | 18.0 | 1993 | 18.0 | 1994 | 17.5 | 1995 | 17.5 | 1996 | 17.5 | 1997 | 17.2 |
| 1987 | 17.7 | 1988 | 17.7 | 1989 | 17.7 | 1990 | 17.7 | 1991 | 17.3 | 1992 | 17.3 | 1993 | 17.3 | 1994 | 16.8 | 1995 | 16.8 | 1996 | 16.8 | 1997 | 16.5 | 1998 | 16.5 |
| 1988 | 16.8 | 1989 | 16.8 | 1990 | 16.8 | 1991 | 16.5 | 1992 | 16.5 | 1993 | 16.5 | 1994 | 16.0 | 1995 | 16.0 | 1996 | 16.0 | 1997 | 15.7 | 1998 | 15.7 | 1999 | 15.7 |
| 1989 | 15.9 | 1990 | 15.9 | 1991 | 15.6 | 1992 | 15.6 | 1993 | 15.6 | 1994 | 15.2 | 1995 | 15.2 | 1996 | 15.2 | 1997 | 14.9 | 1998 | 14.9 | 1999 | 14.9 | 2000 | 14.9 |
| 1990 | 14.9 | 1991 | 14.6 | 1992 | 14.6 | 1993 | 14.6 | 1994 | 14.2 | 1995 | 14.2 | 1996 | 14.2 | 1997 | 14.0 | 1998 | 14.0 | 1999 | 14.0 | 2000 | 14.0 | 2001 | 14.0 |
| 1991 | 13.5 | 1992 | 13.5 | 1993 | 13.5 | 1994 | 13.2 | 1995 | 13.2 | 1996 | 13.2 | 1997 | 12.9 | 1998 | 12.9 | 1999 | 12.9 | 2000 | 12.9 | 2001 | 12.9 | 2002 | 12.9 |
| 1992 | 13.0 | 1993 | 13.0 | 1994 | 12.6 | 1995 | 12.6 | 1996 | 12.6 | 1997 | 12.4 | 1998 | 12.4 | 1999 | 12.4 | 2000 | 12.4 | 2001 | 12.4 | 2002 | 12.4 | 2003 | 12.4 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F. Emissions are based on the January 1 mileage accumulation figures given in Table 1.4.4.

TABLE 1.4.2C

DATE : MAY 25, 1985

## EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
## HEAVY DUTY GASOLINE POWERED VEHICLES
## NOx

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 7.9 | 1962 | 7.9 | 1963 | 8.1 | 1964 | 8.1 | 1965 | 8.1 | 1966 | 8.1 | 1967 | 8.1 | 1968 | 8.1 | 1969 | 8.1 | 1970 | 9.3 | 1971 | 9.3 | 1972 | 9.3 |
| 1962 | 7.9 | 1963 | 8.1 | 1964 | 8.1 | 1965 | 8.1 | 1966 | 8.1 | 1967 | 8.1 | 1968 | 8.1 | 1969 | 8.1 | 1970 | 9.3 | 1971 | 9.3 | 1972 | 9.3 | 1973 | 9.3 |
| 1963 | 8.1 | 1964 | 8.1 | 1965 | 8.1 | 1966 | 8.1 | 1967 | 8.1 | 1968 | 8.1 | 1969 | 8.1 | 1970 | 9.3 | 1971 | 9.3 | 1972 | 9.3 | 1973 | 9.3 | 1974 | 7.3 |
| 1964 | 8.1 | 1965 | 8.1 | 1966 | 8.1 | 1967 | 8.1 | 1968 | 8.1 | 1969 | 8.1 | 1970 | 9.3 | 1971 | 9.3 | 1972 | 9.3 | 1973 | 9.3 | 1974 | 7.3 | 1975 | 7.3 |
| 1965 | 8.1 | 1966 | 8.1 | 1967 | 8.1 | 1968 | 8.1 | 1969 | 8.1 | 1970 | 9.3 | 1971 | 9.3 | 1972 | 9.3 | 1973 | 9.3 | 1974 | 7.2 | 1975 | 7.2 | 1976 | 7.2 |
| 1966 | 8.1 | 1967 | 8.1 | 1968 | 8.1 | 1969 | 8.1 | 1970 | 9.3 | 1971 | 9.3 | 1972 | 9.3 | 1973 | 9.3 | 1974 | 7.2 | 1975 | 7.2 | 1976 | 7.2 | 1977 | 7.2 |
| 1967 | 8.1 | 1968 | 8.1 | 1969 | 8.1 | 1970 | 9.3 | 1971 | 9.3 | 1972 | 9.3 | 1973 | 9.3 | 1974 | 7.2 | 1975 | 7.2 | 1976 | 7.2 | 1977 | 7.2 | 1978 | 6.3 |
| 1968 | 8.1 | 1969 | 8.1 | 1970 | 9.3 | 1971 | 9.3 | 1972 | 9.3 | 1973 | 9.3 | 1974 | 7.1 | 1975 | 7.1 | 1976 | 7.1 | 1977 | 7.1 | 1978 | 6.3 | 1979 | 6.0 |
| 1969 | 8.1 | 1970 | 9.3 | 1971 | 9.3 | 1972 | 9.3 | 1973 | 9.3 | 1974 | 7.1 | 1975 | 7.1 | 1976 | 7.1 | 1977 | 7.1 | 1978 | 6.2 | 1979 | 6.0 | 1980 | 6.0 |
| 1970 | 9.3 | 1971 | 9.3 | 1972 | 9.3 | 1973 | 9.3 | 1974 | 7.0 | 1975 | 7.0 | 1976 | 7.0 | 1977 | 7.0 | 1978 | 6.2 | 1979 | 5.9 | 1980 | 5.9 | 1981 | 5.6 |
| 1971 | 9.3 | 1972 | 9.3 | 1973 | 9.3 | 1974 | 7.0 | 1975 | 7.0 | 1976 | 7.0 | 1977 | 7.0 | 1978 | 6.1 | 1979 | 5.9 | 1980 | 5.9 | 1981 | 5.5 | 1982 | 5.5 |
| 1972 | 9.3 | 1973 | 9.3 | 1974 | 6.9 | 1975 | 6.9 | 1976 | 6.9 | 1977 | 6.9 | 1978 | 6.1 | 1979 | 5.8 | 1980 | 5.8 | 1981 | 5.5 | 1982 | 5.5 | 1983 | 5.4 |
| 1973 | 9.3 | 1974 | 6.8 | 1975 | 6.8 | 1976 | 6.8 | 1977 | 6.8 | 1978 | 6.0 | 1979 | 5.7 | 1980 | 5.7 | 1981 | 5.4 | 1982 | 5.4 | 1983 | 5.3 | 1984 | 5.4 |
| 1974 | 6.7 | 1975 | 6.7 | 1976 | 6.7 | 1977 | 6.7 | 1978 | 5.9 | 1979 | 5.7 | 1980 | 5.7 | 1981 | 5.3 | 1982 | 5.3 | 1983 | 5.3 | 1984 | 5.3 | 1985 | 5.1 |
| 1975 | 6.7 | 1976 | 6.7 | 1977 | 6.7 | 1978 | 5.9 | 1979 | 5.6 | 1980 | 5.6 | 1981 | 5.3 | 1982 | 5.3 | 1983 | 5.2 | 1984 | 5.2 | 1985 | 5.0 | 1986 | 5.0 |
| 1976 | 6.6 | 1977 | 6.6 | 1978 | 5.8 | 1979 | 5.5 | 1980 | 5.5 | 1981 | 5.2 | 1982 | 5.2 | 1983 | 5.1 | 1984 | 5.1 | 1985 | 5.0 | 1986 | 5.0 | 1987 | 5.2 |
| 1977 | 6.4 | 1978 | 5.7 | 1979 | 5.4 | 1980 | 5.4 | 1981 | 5.1 | 1982 | 5.1 | 1983 | 5.0 | 1984 | 5.0 | 1985 | 4.9 | 1986 | 5.0 | 1987 | 5.1 | 1988 | 5.1 |
| 1978 | 5.6 | 1979 | 5.3 | 1980 | 5.3 | 1981 | 5.0 | 1982 | 5.0 | 1983 | 4.9 | 1984 | 4.9 | 1985 | 4.9 | 1986 | 4.9 | 1987 | 4.9 | 1988 | 4.9 | 1989 | 4.9 |
| 1979 | 5.2 | 1980 | 5.2 | 1981 | 4.9 | 1982 | 4.9 | 1983 | 4.8 | 1984 | 4.8 | 1985 | 4.8 | 1986 | 4.8 | 1987 | 4.7 | 1988 | 4.7 | 1989 | 4.7 | 1990 | 4.7 |
| 1980 | 5.1 | 1981 | 4.8 | 1982 | 4.8 | 1983 | 4.7 | 1984 | 4.8 | 1985 | 4.8 | 1986 | 4.8 | 1987 | 4.6 | 1988 | 4.6 | 1989 | 4.6 | 1990 | 4.6 | 1991 | 4.5 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 9.3 | 1974 | 7.4 | 1975 | 7.4 | 1976 | 7.4 | 1977 | 7.4 | 1978 | 6.5 | 1979 | 6.2 | 1980 | 6.2 | 1981 | 5.9 | 1982 | 5.9 | 1983 | 5.8 | 1984 | 5.8 |
| 1974 | 7.3 | 1975 | 7.3 | 1976 | 7.3 | 1977 | 7.3 | 1978 | 6.5 | 1979 | 6.2 | 1980 | 6.2 | 1981 | 5.8 | 1982 | 5.8 | 1983 | 5.8 | 1984 | 5.8 | 1985 | 5.3 |
| 1975 | 7.3 | 1976 | 7.3 | 1977 | 7.3 | 1978 | 6.4 | 1979 | 6.2 | 1980 | 6.2 | 1981 | 5.8 | 1982 | 5.8 | 1983 | 5.8 | 1984 | 5.8 | 1985 | 5.3 | 1986 | 5.3 |
| 1976 | 7.3 | 1977 | 7.3 | 1978 | 6.4 | 1979 | 6.1 | 1980 | 6.1 | 1981 | 5.8 | 1982 | 5.8 | 1983 | 5.7 | 1984 | 5.8 | 1985 | 5.3 | 1986 | 5.3 | 1987 | 6.3 |
| 1977 | 7.2 | 1978 | 6.4 | 1979 | 6.1 | 1980 | 6.1 | 1981 | 5.8 | 1982 | 5.8 | 1983 | 5.7 | 1984 | 5.7 | 1985 | 5.3 | 1986 | 5.3 | 1987 | 6.2 | 1988 | 6.2 |
| 1978 | 6.3 | 1979 | 6.1 | 1980 | 6.1 | 1981 | 5.7 | 1982 | 5.7 | 1983 | 5.7 | 1984 | 5.7 | 1985 | 5.3 | 1986 | 5.3 | 1987 | 6.2 | 1988 | 6.2 | 1989 | 6.2 |
| 1979 | 6.0 | 1980 | 6.0 | 1981 | 5.7 | 1982 | 5.7 | 1983 | 5.6 | 1984 | 5.7 | 1985 | 5.2 | 1986 | 5.3 | 1987 | 6.1 | 1988 | 6.1 | 1989 | 6.1 | 1990 | 6.1 |
| 1980 | 6.0 | 1981 | 5.7 | 1982 | 5.7 | 1983 | 5.6 | 1984 | 5.6 | 1985 | 5.2 | 1986 | 5.3 | 1987 | 6.0 | 1988 | 6.0 | 1989 | 6.0 | 1990 | 6.0 | 1991 | 5.8 |
| 1981 | 5.6 | 1982 | 5.6 | 1983 | 5.6 | 1984 | 5.6 | 1985 | 5.2 | 1986 | 5.2 | 1987 | 6.0 | 1988 | 6.0 | 1989 | 6.0 | 1990 | 6.0 | 1991 | 5.7 | 1992 | 5.7 |
| 1982 | 5.6 | 1983 | 5.5 | 1984 | 5.5 | 1985 | 5.2 | 1986 | 5.2 | 1987 | 5.9 | 1988 | 5.9 | 1989 | 5.9 | 1990 | 5.9 | 1991 | 5.7 | 1992 | 5.7 | 1993 | 5.7 |
| 1983 | 5.5 | 1984 | 5.5 | 1985 | 5.2 | 1986 | 5.2 | 1987 | 5.8 | 1988 | 5.8 | 1989 | 5.8 | 1990 | 5.8 | 1991 | 5.6 | 1992 | 5.6 | 1993 | 5.6 | 1994 | 5.5 |
| 1984 | 5.4 | 1985 | 5.1 | 1986 | 5.2 | 1987 | 5.7 | 1988 | 5.7 | 1989 | 5.7 | 1990 | 5.7 | 1991 | 5.5 | 1992 | 5.5 | 1993 | 5.5 | 1994 | 5.4 | 1995 | 5.4 |
| 1985 | 5.1 | 1986 | 5.1 | 1987 | 5.6 | 1988 | 5.6 | 1989 | 5.6 | 1990 | 5.6 | 1991 | 5.4 | 1992 | 5.4 | 1993 | 5.4 | 1994 | 5.3 | 1995 | 5.3 | 1996 | 5.3 |
| 1986 | 5.1 | 1987 | 5.5 | 1988 | 5.5 | 1989 | 5.5 | 1990 | 5.5 | 1991 | 5.3 | 1992 | 5.3 | 1993 | 5.3 | 1994 | 5.2 | 1995 | 5.2 | 1996 | 5.2 | 1997 | 5.1 |
| 1987 | 5.4 | 1988 | 5.4 | 1989 | 5.4 | 1990 | 5.4 | 1991 | 5.2 | 1992 | 5.2 | 1993 | 5.2 | 1994 | 5.1 | 1995 | 5.1 | 1996 | 5.1 | 1997 | 5.0 | 1998 | 5.0 |
| 1988 | 5.2 | 1989 | 5.2 | 1990 | 5.2 | 1991 | 5.1 | 1992 | 5.1 | 1993 | 5.1 | 1994 | 4.9 | 1995 | 4.9 | 1996 | 4.9 | 1997 | 4.9 | 1998 | 4.9 | 1999 | 4.9 |
| 1989 | 5.1 | 1990 | 5.1 | 1991 | 4.9 | 1992 | 4.9 | 1993 | 4.9 | 1994 | 4.8 | 1995 | 4.8 | 1996 | 4.8 | 1997 | 4.7 | 1998 | 4.7 | 1999 | 4.7 | 2000 | 4.7 |
| 1990 | 4.9 | 1991 | 4.8 | 1992 | 4.8 | 1993 | 4.8 | 1994 | 4.6 | 1995 | 4.6 | 1996 | 4.6 | 1997 | 4.6 | 1998 | 4.6 | 1999 | 4.6 | 2000 | 4.6 | 2001 | 4.6 |
| 1991 | 4.6 | 1992 | 4.6 | 1993 | 4.6 | 1994 | 4.5 | 1995 | 4.5 | 1996 | 4.5 | 1997 | 4.4 | 1998 | 4.4 | 1999 | 4.4 | 2000 | 4.4 | 2001 | 4.4 | 2002 | 4.4 |
| 1992 | 4.5 | 1993 | 4.5 | 1994 | 4.4 | 1995 | 4.4 | 1996 | 4.4 | 1997 | 4.3 | 1998 | 4.3 | 1999 | 4.3 | 2000 | 4.3 | 2001 | 4.3 | 2002 | 4.3 | 2003 | 4.3 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F. Emissions are based on the January 1 mileage accumulation figures given in Table 1.4.4.

## TABLE 1.4.3

## IDLE EMISSION RATES FOR LOW ALTITUDE HEAVY DUTY GASOLINE POWERED VEHICLES

* IER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Min.) | Deterioration Rate (Gm/Min/10K Mi) |
|---|---|---|---|
| HC | Pre-1963 | 2.29 | 0.04 |
| | 1963-1969 | 2.29 | 0.04 |
| | 1970-1973 | 0.85 | 0.04 |
| | 1974-1977 | 0.85 | 0.02 |
| | 1978 | 0.85 | 0.02 |
| | 1979-1980 | 0.14 | 0.01 |
| | 1981-1982 | 0.43 | 0.02 |
| | 1983 | 0.43 | 0.03 |
| | 1984 | 0.43 | 0.03 |
| | 1985 | 0.10 | 0.03 |
| | 1986 | 0.10 | 0.03 |
| | 1987-1990 | 0.10 | 0.03 |
| | 1991-1993 | 0.10 | 0.03 |
| | 1994-1996 | 0.10 | 0.03 |
| | 1997+ | 0.10 | 0.03 |
| CO | Pre-1963 | 22.18 | 0.53 |
| | 1963-1969 | 22.18 | 0.53 |
| | 1970-1973 | 6.15 | 0.28 |
| | 1974-1977 | 6.15 | 0.27 |
| | 1978 | 6.15 | 0.27 |
| | 1979-1980 | 6.42 | 0.28 |
| | 1981-1982 | 6.42 | 0.28 |
| | 1983 | 6.42 | 0.28 |
| | 1984 | 0.70 | 0.14 |
| | 1985 | 0.34 | 0.18 |
| | 1986 | 0.34 | 0.18 |
| | 1987-1990 | 0.34 | 0.18 |
| | 1991-1993 | 0.34 | 0.18 |
| | 1994-1996 | 0.34 | 0.18 |
| | 1997+ | 0.34 | 0.18 |
| NOx | Pre-1963 | 0.04 | 0.0 |
| | 1963-1969 | 0.04 | 0.0 |
| | 1970-1973 | 0.05 | 0.0 |
| | 1974-1977 | 0.06 | 0.0 |
| | 1978 | 0.06 | 0.0 |
| | 1979-1980 | 0.06 | 0.0 |
| | 1981-1982 | 0.06 | 0.0 |
| | 1983 | 0.06 | 0.0 |
| | 1984 | 0.07 | 0.0 |
| | 1985 | 0.01 | 0.0 |
| | 1986 | 0.01 | 0.0 |
| | 1987-1990 | 0.01 | 0.0 |
| | 1991-1993 | 0.01 | 0.0 |
| | 1994-1996 | 0.01 | 0.0 |
| | 1997+ | 0.01 | 0.0 |

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

DATE : MAY 25, 1985

## TABLE 1.4.4

## REGISTRATION MIX AND MILEAGE ACCUMULATION RATES FOR LOW ALTITUDE HEAVY DUTY GASOLINE POWERED VEHICLES

| Model Year Index** | July 1 Registration Mix* | Mileage Accumulation Rate per vehicle* | Jan 1 Registration Mix | Jan 1 Mileage Accumulation Rate (fleet) | Jan 1 Mileage Accumulation (fleet) |
|---|---|---|---|---|---|
| 1 | 0.079 | 19967. | 0.0 | 0. | 0. |
| 2 | 0.136 | 18077. | 0.136 | 19967. | 9983. |
| 3 | 0.116 | 16365. | 0.116 | 18077. | 29005. |
| 4 | 0.099 | 14815. | 0.099 | 16365. | 46226. |
| 5 | 0.085 | 13413. | 0.085 | 14815. | 61816. |
| 6 | 0.072 | 12143. | 0.072 | 13413. | 75930. |
| 7 | 0.062 | 10993. | 0.062 | 12143. | 88708. |
| 8 | 0.053 | 9952. | 0.053 | 10993. | 100276. |
| 9 | 0.045 | 9010. | 0.045 | 9952. | 110749. |
| 10 | 0.038 | 8156. | 0.038 | 9010. | 120230. |
| 11 | 0.033 | 7384. | 0.033 | 8156. | 128813. |
| 12 | 0.028 | 6685. | 0.028 | 7384. | 136583. |
| 13 | 0.024 | 6052. | 0.024 | 6685. | 143617. |
| 14 | 0.020 | 5479. | 0.020 | 6052. | 149985. |
| 15 | 0.018 | 4960. | 0.018 | 5479. | 155751. |
| 16 | 0.015 | 4490. | 0.015 | 4960. | 160970. |
| 17 | 0.013 | 4065. | 0.013 | 4490. | 165695. |
| 18 | 0.011 | 3680. | 0.011 | 4065. | 169973. |
| 19 | 0.009 | 3332. | 0.009 | 3680. | 173845. |
| 20+ | 0.045 | 3016. | 0.045 | 3332. | 177351. |

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

DATE : MAY 25, 1985

## TABLE 1.4.5

## EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR LOW ALTITUDE HEAVY DUTY GASOLINE POWERED VEHICLES JANUARY 1, 1988

| Model Years | (A) HDGV Fleet Registration | (B) Sales Fraction | (A*B) | (C=A*B/DAF) HDGV Registration | (D) Annual Mileage Accrual Rate | (C*D) | (C*D/TFNORM) Travel Fractions |
|---|---|---|---|---|---|---|---|
| 1988 | 0.0 | 1.000 | 0.0 | 0.0 | 0. | 0.0 | 0.0 |
| 1987 | 0.136 | 1.000 | 0.136 | 0.148 | 19967. | 2945.2 | 0.226 |
| 1986 | 0.116 | 1.000 | 0.116 | 0.126 | 18077. | 2274.3 | 0.175 |
| 1985 | 0.099 | 1.000 | 0.099 | 0.107 | 16365. | 1757.2 | 0.135 |
| 1984 | 0.085 | 1.000 | 0.085 | 0.092 | 14815. | 1365.8 | 0.105 |
| 1983 | 0.072 | 1.000 | 0.072 | 0.078 | 13413. | 1047.4 | 0.080 |
| 1982 | 0.062 | 1.000 | 0.062 | 0.067 | 12143. | 816.6 | 0.063 |
| 1981 | 0.053 | 1.000 | 0.053 | 0.057 | 10993. | 631.9 | 0.049 |
| 1980 | 0.045 | 1.000 | 0.045 | 0.049 | 9952. | 485.7 | 0.037 |
| 1979 | 0.038 | 1.000 | 0.038 | 0.041 | 9010. | 371.3 | 0.029 |
| 1978 | 0.033 | 1.000 | 0.033 | 0.036 | 8156. | 291.9 | 0.022 |
| 1977 | 0.028 | 1.000 | 0.028 | 0.030 | 7384. | 224.2 | 0.017 |
| 1976 | 0.024 | 1.000 | 0.024 | 0.026 | 6685. | 174.0 | 0.013 |
| 1975 | 0.020 | 1.000 | 0.020 | 0.022 | 6052. | 131.3 | 0.010 |
| 1974 | 0.018 | 1.000 | 0.018 | 0.020 | 5479. | 107.0 | 0.008 |
| 1973 | 0.015 | 1.000 | 0.015 | 0.016 | 4960. | 80.7 | 0.006 |
| 1972 | 0.013 | 1.000 | 0.013 | 0.014 | 4490. | 63.3 | 0.005 |
| 1971 | 0.011 | 1.000 | 0.011 | 0.012 | 4065. | 48.5 | 0.004 |
| 1970 | 0.009 | 1.000 | 0.009 | 0.010 | 3680. | 35.9 | 0.003 |
| 1969- | 0.045 | 1.000 | 0.045 | 0.049 | 3332. | 162.6 | 0.012 |
|  |  | DAF: | 0.921 |  | TFNORM: | 13015.0 |  |

WHERE :

A = January 1 registration mix from Table 1.4.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 1.4.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI) = .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

DATE : MAY 25, 1985

## TABLE 1.4.6

## SPEED CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE HEAVY DUTY GASOLINE POWERED VEHICLES

$$* \ SCF(s) = EXP(A + B*s + C*s^2) \text{ , HC \& CO}$$
$$= A + B*s + C*s^2 \text{ , NOx}$$

| Pol | Model Years | Coefficients A | B | C |
|---|---|---|---|---|
| HC | All | 1.60800 | -0.09700 | 0.00083 |
| CO | All | 1.52000 | -0.09800 | 0.00110 |
| NOx | All | 0.82400 | 0.00880 | 0.0 |

* WHERE: s = average speed (mph)

DATE : MAY 25, 1985

## TABLE 1.4.7

## TEMPERATURE CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE HEAVY DUTY GASOLINE POWERED VEHICLES

* TCF = EXP( TC * (T - 75.0))

| Pol | Model Years | TC Low | TC High |
|---|---|---|---|
| HC | Pre-1970 | -0.58903E-02 | 0.13458E-02 |
| | 1970-1973 | -0.73870E-02 | 0.52317E-02 |
| | 1974-1978 | -0.49759E-02 | 0.54651E-02 |
| | 1979-1983 | -0.28549E-02 | 0.10082E-01 |
| | 1984 | -0.74107E-02 | 0.20546E-01 |
| | 1985+ | -0.92859E-02 | 0.84842E-02 |
| CO | Pre-1970 | -0.20576E-02 | 0.81720E-02 |
| | 1970-1973 | -0.45541E-02 | 0.20268E-01 |
| | 1974-1978 | -0.42899E-02 | 0.24127E-01 |
| | 1979-1983 | -0.13085E-02 | 0.22061E-01 |
| | 1984 | -0.77117E-02 | 0.27019E-01 |
| | 1985+ | -0.60195E-02 | 0.71457E-02 |
| NOx | Pre-1970 | -0.64315E-02 | -0.83986E-02 |
| | 1970-1973 | -0.55456E-02 | -0.86880E-02 |
| | 1974-1978 | -0.13969E-02 | -0.18079E-01 |
| | 1979-1983 | -0.46352E-03 | -0.74889E-02 |
| | 1984 | -0.57524E-02 | -0.21593E-01 |
| | 1985+ | -0.19733E-02 | -0.29584E-01 |

* WHERE :

TCF = Temperature correction factor for appropriate pollutant, ambient temperature, and model year
T = Ambient temperature (Fahrenheit)
TC = Temperature correction factor coefficient for appropriate pollutant, reference temperature, and model year
75.0 = Reference temperature

DATE : MAY 25, 1985

## TABLE 1.5.1

## EXHAUST EMISSION RATES FOR
## LOW ALTITUDE
## LIGHT DUTY DIESEL POWERED VEHICLES
## (RATES REFLECT ZERO TAMPERING)

$* BER = ZML + (DR * M)$

| Pol | Model Years | Zero Mile Emission Level (Grams/Mile) | Deterioration Rate (Gm/Mi/10K Mi) | 50,000 Mile Emission Level (Grams/Mile) |
|---|---|---|---|---|
| HC | Pre-1975 | 1.31 | 0.08 | 1.71 |
| | 1975-1976 | 0.42 | 0.07 | 0.77 |
| | 1977 | 0.42 | 0.07 | 0.77 |
| | 1978 | 0.42 | 0.07 | 0.77 |
| | 1979 | 0.42 | 0.07 | 0.77 |
| | 1980+ | 0.29 | 0.03 | 0.44 |
| CO | Pre-1975 | 2.71 | 0.13 | 3.36 |
| | 1975-1976 | 1.17 | 0.09 | 1.62 |
| | 1977 | 1.17 | 0.09 | 1.62 |
| | 1978 | 1.17 | 0.09 | 1.62 |
| | 1979 | 1.17 | 0.09 | 1.62 |
| | 1980+ | 1.15 | 0.04 | 1.35 |
| NOx | Pre-1975 | 1.46 | 0.04 | 1.66 |
| | 1975-1976 | 1.40 | 0.04 | 1.60 |
| | 1977 | 1.40 | 0.04 | 1.60 |
| | 1978 | 1.40 | 0.04 | 1.60 |
| | 1979 | 1.40 | 0.04 | 1.60 |
| | 1980 | 1.40 | 0.04 | 1.60 |
| | 1981-1984 | 1.31 | 0.03 | 1.46 |
| | 1985+ | 0.87 | 0.03 | 1.02 |

* WHERE : BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

DATE : MAY 25, 1985

TABLE 1.5.2A

DATE : MAY 25, 1985

# EXHAUST EMISSION LEVELS FOR LOW ALTITUDE LIGHT DUTY DIESEL POWERED VEHICLES
## TOTAL HC

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 2.5 | 1962 | 2.5 | 1963 | 2.5 | 1964 | 2.5 | 1965 | 2.5 | 1966 | 2.5 | 1967 | 2.5 | 1968 | 2.5 | 1969 | 2.5 | 1970 | 2.5 | 1971 | 2.5 | 1972 | 2.5 |
| 1962 | 2.5 | 1963 | 2.5 | 1964 | 2.5 | 1965 | 2.5 | 1966 | 2.5 | 1967 | 2.5 | 1968 | 2.5 | 1969 | 2.5 | 1970 | 2.5 | 1971 | 2.5 | 1972 | 2.5 | 1973 | 2.5 |
| 1963 | 2.5 | 1964 | 2.5 | 1965 | 2.5 | 1966 | 2.5 | 1967 | 2.5 | 1968 | 2.5 | 1969 | 2.5 | 1970 | 2.5 | 1971 | 2.5 | 1972 | 2.5 | 1973 | 2.5 | 1974 | 2.5 |
| 1964 | 2.4 | 1965 | 2.4 | 1966 | 2.4 | 1967 | 2.4 | 1968 | 2.4 | 1969 | 2.4 | 1970 | 2.4 | 1971 | 2.4 | 1972 | 2.4 | 1973 | 2.4 | 1974 | 2.4 | 1975 | 1.4 |
| 1965 | 2.4 | 1966 | 2.4 | 1967 | 2.4 | 1968 | 2.4 | 1969 | 2.4 | 1970 | 2.4 | 1971 | 2.4 | 1972 | 2.4 | 1973 | 2.4 | 1974 | 2.4 | 1975 | 1.3 | 1976 | 1.3 |
| 1966 | 2.3 | 1967 | 2.3 | 1968 | 2.3 | 1969 | 2.3 | 1970 | 2.3 | 1971 | 2.3 | 1972 | 2.3 | 1973 | 2.3 | 1974 | 2.3 | 1975 | 1.3 | 1976 | 1.3 | 1977 | 1.3 |
| 1967 | 2.3 | 1968 | 2.3 | 1969 | 2.3 | 1970 | 2.3 | 1971 | 2.3 | 1972 | 2.3 | 1973 | 2.3 | 1974 | 2.3 | 1975 | 1.3 | 1976 | 1.3 | 1977 | 1.3 | 1978 | 1.3 |
| 1968 | 2.2 | 1969 | 2.2 | 1970 | 2.2 | 1971 | 2.2 | 1972 | 2.2 | 1973 | 2.2 | 1974 | 2.2 | 1975 | 1.2 | 1976 | 1.2 | 1977 | 1.2 | 1978 | 1.2 | 1979 | 1.2 |
| 1969 | 2.2 | 1970 | 2.2 | 1971 | 2.2 | 1972 | 2.2 | 1973 | 2.2 | 1974 | 2.2 | 1975 | 1.2 | 1976 | 1.2 | 1977 | 1.2 | 1978 | 1.2 | 1979 | 1.2 | 1980 | 0.6 |
| 1970 | 2.1 | 1971 | 2.1 | 1972 | 2.1 | 1973 | 2.1 | 1974 | 2.1 | 1975 | 1.1 | 1976 | 1.1 | 1977 | 1.1 | 1978 | 1.1 | 1979 | 1.1 | 1980 | 0.6 | 1981 | 0.6 |
| 1971 | 2.0 | 1972 | 2.0 | 1973 | 2.0 | 1974 | 2.0 | 1975 | 1.1 | 1976 | 1.1 | 1977 | 1.1 | 1978 | 1.1 | 1979 | 1.1 | 1980 | 0.6 | 1981 | 0.6 | 1982 | 0.6 |
| 1972 | 2.0 | 1973 | 2.0 | 1974 | 2.0 | 1975 | 1.0 | 1976 | 1.0 | 1977 | 1.0 | 1978 | 1.0 | 1979 | 1.0 | 1980 | 0.5 | 1981 | 0.5 | 1982 | 0.5 | 1983 | 0.5 |
| 1973 | 1.9 | 1974 | 1.9 | 1975 | 0.9 | 1976 | 0.9 | 1977 | 0.9 | 1978 | 0.9 | 1979 | 0.9 | 1980 | 0.5 | 1981 | 0.5 | 1982 | 0.5 | 1983 | 0.5 | 1984 | 0.5 |
| 1974 | 1.8 | 1975 | 0.9 | 1976 | 0.9 | 1977 | 0.9 | 1978 | 0.9 | 1979 | 0.9 | 1980 | 0.5 | 1981 | 0.5 | 1982 | 0.5 | 1983 | 0.5 | 1984 | 0.5 | 1985 | 0.5 |
| 1975 | 0.8 | 1976 | 0.8 | 1977 | 0.8 | 1978 | 0.8 | 1979 | 0.8 | 1980 | 0.5 | 1981 | 0.5 | 1982 | 0.5 | 1983 | 0.5 | 1984 | 0.5 | 1985 | 0.5 | 1986 | 0.5 |
| 1976 | 0.7 | 1977 | 0.7 | 1978 | 0.7 | 1979 | 0.7 | 1980 | 0.4 | 1981 | 0.4 | 1982 | 0.4 | 1983 | 0.4 | 1984 | 0.4 | 1985 | 0.4 | 1986 | 0.4 | 1987 | 0.4 |
| 1977 | 0.7 | 1978 | 0.7 | 1979 | 0.7 | 1980 | 0.4 | 1981 | 0.4 | 1982 | 0.4 | 1983 | 0.4 | 1984 | 0.4 | 1985 | 0.4 | 1986 | 0.4 | 1987 | 0.4 | 1988 | 0.4 |
| 1978 | 0.6 | 1979 | 0.6 | 1980 | 0.4 | 1981 | 0.4 | 1982 | 0.4 | 1983 | 0.4 | 1984 | 0.4 | 1985 | 0.4 | 1986 | 0.4 | 1987 | 0.4 | 1988 | 0.4 | 1989 | 0.4 |
| 1979 | 0.5 | 1980 | 0.3 | 1981 | 0.3 | 1982 | 0.3 | 1983 | 0.3 | 1984 | 0.3 | 1985 | 0.3 | 1986 | 0.3 | 1987 | 0.3 | 1988 | 0.3 | 1989 | 0.3 | 1990 | 0.3 |
| 1980 | 0.3 | 1981 | 0.3 | 1982 | 0.3 | 1983 | 0.3 | 1984 | 0.3 | 1985 | 0.3 | 1986 | 0.3 | 1987 | 0.3 | 1988 | 0.3 | 1989 | 0.3 | 1990 | 0.3 | 1991 | 0.3 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 2.5 | 1974 | 2.5 | 1975 | 1.5 | 1976 | 1.5 | 1977 | 1.5 | 1978 | 1.5 | 1979 | 1.5 | 1980 | 0.7 | 1981 | 0.7 | 1982 | 0.7 | 1983 | 0.7 | 1984 | 0.7 |
| 1974 | 2.5 | 1975 | 1.5 | 1976 | 1.5 | 1977 | 1.5 | 1978 | 1.5 | 1979 | 1.5 | 1980 | 0.7 | 1981 | 0.7 | 1982 | 0.7 | 1983 | 0.7 | 1984 | 0.7 | 1985 | 0.7 |
| 1975 | 1.4 | 1976 | 1.4 | 1977 | 1.4 | 1978 | 1.4 | 1979 | 1.4 | 1980 | 0.7 | 1981 | 0.7 | 1982 | 0.7 | 1983 | 0.7 | 1984 | 0.7 | 1985 | 0.7 | 1986 | 0.7 |
| 1976 | 1.4 | 1977 | 1.4 | 1978 | 1.4 | 1979 | 1.4 | 1980 | 0.7 | 1981 | 0.7 | 1982 | 0.7 | 1983 | 0.7 | 1984 | 0.7 | 1985 | 0.7 | 1986 | 0.7 | 1987 | 0.7 |
| 1977 | 1.3 | 1978 | 1.3 | 1979 | 1.3 | 1980 | 0.7 | 1981 | 0.7 | 1982 | 0.7 | 1983 | 0.7 | 1984 | 0.7 | 1985 | 0.7 | 1986 | 0.7 | 1987 | 0.7 | 1988 | 0.7 |
| 1978 | 1.3 | 1979 | 1.3 | 1980 | 0.7 | 1981 | 0.7 | 1982 | 0.7 | 1983 | 0.7 | 1984 | 0.7 | 1985 | 0.7 | 1986 | 0.7 | 1987 | 0.7 | 1988 | 0.7 | 1989 | 0.7 |
| 1979 | 1.3 | 1980 | 0.6 | 1981 | 0.6 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 |
| 1980 | 0.6 | 1981 | 0.6 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 | 1991 | 0.6 |
| 1981 | 0.6 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 | 1991 | 0.6 | 1992 | 0.6 |
| 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 | 1991 | 0.6 | 1992 | 0.6 | 1993 | 0.6 |
| 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 | 1991 | 0.6 | 1992 | 0.6 | 1993 | 0.6 | 1994 | 0.6 |
| 1984 | 0.5 | 1985 | 0.5 | 1986 | 0.5 | 1987 | 0.5 | 1988 | 0.5 | 1989 | 0.5 | 1990 | 0.5 | 1991 | 0.5 | 1992 | 0.5 | 1993 | 0.5 | 1994 | 0.5 | 1995 | 0.5 |
| 1985 | 0.5 | 1986 | 0.5 | 1987 | 0.5 | 1988 | 0.5 | 1989 | 0.5 | 1990 | 0.5 | 1991 | 0.5 | 1992 | 0.5 | 1993 | 0.5 | 1994 | 0.5 | 1995 | 0.5 | 1996 | 0.5 |
| 1986 | 0.5 | 1987 | 0.5 | 1988 | 0.5 | 1989 | 0.5 | 1990 | 0.5 | 1991 | 0.5 | 1992 | 0.5 | 1993 | 0.5 | 1994 | 0.5 | 1995 | 0.5 | 1996 | 0.5 | 1997 | 0.5 |
| 1987 | 0.5 | 1988 | 0.5 | 1989 | 0.5 | 1990 | 0.5 | 1991 | 0.5 | 1992 | 0.5 | 1993 | 0.5 | 1994 | 0.5 | 1995 | 0.5 | 1996 | 0.5 | 1997 | 0.5 | 1998 | 0.5 |
| 1988 | 0.4 | 1989 | 0.4 | 1990 | 0.4 | 1991 | 0.4 | 1992 | 0.4 | 1993 | 0.4 | 1994 | 0.4 | 1995 | 0.4 | 1996 | 0.4 | 1997 | 0.4 | 1998 | 0.4 | 1999 | 0.4 |
| 1989 | 0.4 | 1990 | 0.4 | 1991 | 0.4 | 1992 | 0.4 | 1993 | 0.4 | 1994 | 0.4 | 1995 | 0.4 | 1996 | 0.4 | 1997 | 0.4 | 1998 | 0.4 | 1999 | 0.4 | 2000 | 0.4 |
| 1990 | 0.4 | 1991 | 0.4 | 1992 | 0.4 | 1993 | 0.4 | 1994 | 0.4 | 1995 | 0.4 | 1996 | 0.4 | 1997 | 0.4 | 1998 | 0.4 | 1999 | 0.4 | 2000 | 0.4 | 2001 | 0.4 |
| 1991 | 0.3 | 1992 | 0.3 | 1993 | 0.3 | 1994 | 0.3 | 1995 | 0.3 | 1996 | 0.3 | 1997 | 0.3 | 1998 | 0.3 | 1999 | 0.3 | 2000 | 0.3 | 2001 | 0.3 | 2002 | 0.3 |
| 1992 | 0.3 | 1993 | 0.3 | 1994 | 0.3 | 1995 | 0.3 | 1996 | 0.3 | 1997 | 0.3 | 1998 | 0.3 | 1999 | 0.3 | 2000 | 0.3 | 2001 | 0.3 | 2002 | 0.3 | 2003 | 0.3 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.5.4.

TABLE 1.5.2B

DATE : MAY 25, 1985

# EXHAUST EMISSION LEVELS FOR LOW ALTITUDE LIGHT DUTY DIESEL POWERED VEHICLES

## CO

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 4.7 | 1962 | 4.7 | 1963 | 4.7 | 1964 | 4.7 | 1965 | 4.7 | 1966 | 4.7 | 1967 | 4.7 | 1968 | 4.7 | 1969 | 4.7 | 1970 | 4.7 | 1971 | 4.7 | 1972 | 4.7 |
| 1962 | 4.6 | 1963 | 4.6 | 1964 | 4.6 | 1965 | 4.6 | 1966 | 4.6 | 1967 | 4.6 | 1968 | 4.6 | 1969 | 4.6 | 1970 | 4.6 | 1971 | 4.6 | 1972 | 4.6 | 1973 | 4.6 |
| 1963 | 4.6 | 1964 | 4.6 | 1965 | 4.6 | 1966 | 4.6 | 1967 | 4.6 | 1968 | 4.6 | 1969 | 4.6 | 1970 | 4.6 | 1971 | 4.6 | 1972 | 4.6 | 1973 | 4.6 | 1974 | 4.6 |
| 1964 | 4.5 | 1965 | 4.5 | 1966 | 4.5 | 1967 | 4.5 | 1968 | 4.5 | 1969 | 4.5 | 1970 | 4.5 | 1971 | 4.5 | 1972 | 4.5 | 1973 | 4.5 | 1974 | 4.5 | 1975 | 2.4 |
| 1965 | 4.4 | 1966 | 4.4 | 1967 | 4.4 | 1968 | 4.4 | 1969 | 4.4 | 1970 | 4.4 | 1971 | 4.4 | 1972 | 4.4 | 1973 | 4.4 | 1974 | 4.4 | 1975 | 2.4 | 1976 | 2.4 |
| 1966 | 4.3 | 1967 | 4.3 | 1968 | 4.3 | 1969 | 4.3 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 4.3 | 1974 | 4.3 | 1975 | 2.3 | 1976 | 2.3 | 1977 | 2.3 |
| 1967 | 4.3 | 1968 | 4.3 | 1969 | 4.3 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 4.3 | 1974 | 4.3 | 1975 | 2.2 | 1976 | 2.2 | 1977 | 2.2 | 1978 | 2.2 |
| 1968 | 4.2 | 1969 | 4.2 | 1970 | 4.2 | 1971 | 4.2 | 1972 | 4.2 | 1973 | 4.2 | 1974 | 4.2 | 1975 | 2.2 | 1976 | 2.2 | 1977 | 2.2 | 1978 | 2.2 | 1979 | 2.2 |
| 1969 | 4.1 | 1970 | 4.1 | 1971 | 4.1 | 1972 | 4.1 | 1973 | 4.1 | 1974 | 4.1 | 1975 | 2.1 | 1976 | 2.1 | 1977 | 2.1 | 1978 | 2.1 | 1979 | 2.1 | 1980 | 1.6 |
| 1970 | 4.0 | 1971 | 4.0 | 1972 | 4.0 | 1973 | 4.0 | 1974 | 4.0 | 1975 | 2.1 | 1976 | 2.1 | 1977 | 2.1 | 1978 | 2.1 | 1979 | 2.1 | 1980 | 1.5 | 1981 | 1.5 |
| 1971 | 3.9 | 1972 | 3.9 | 1973 | 3.9 | 1974 | 3.9 | 1975 | 2.0 | 1976 | 2.0 | 1977 | 2.0 | 1978 | 2.0 | 1979 | 2.0 | 1980 | 1.5 | 1981 | 1.5 | 1982 | 1.5 |
| 1972 | 3.8 | 1973 | 3.8 | 1974 | 3.8 | 1975 | 1.9 | 1976 | 1.9 | 1977 | 1.9 | 1978 | 1.9 | 1979 | 1.9 | 1980 | 1.5 | 1981 | 1.5 | 1982 | 1.5 | 1983 | 1.5 |
| 1973 | 3.7 | 1974 | 3.7 | 1975 | 1.8 | 1976 | 1.8 | 1977 | 1.8 | 1978 | 1.8 | 1979 | 1.8 | 1980 | 1.4 | 1981 | 1.4 | 1982 | 1.4 | 1983 | 1.4 | 1984 | 1.4 |
| 1974 | 3.6 | 1975 | 1.8 | 1976 | 1.8 | 1977 | 1.8 | 1978 | 1.8 | 1979 | 1.8 | 1980 | 1.4 | 1981 | 1.4 | 1982 | 1.4 | 1983 | 1.4 | 1984 | 1.4 | 1985 | 1.4 |
| 1975 | 1.7 | 1976 | 1.7 | 1977 | 1.7 | 1978 | 1.7 | 1979 | 1.7 | 1980 | 1.4 | 1981 | 1.4 | 1982 | 1.4 | 1983 | 1.4 | 1984 | 1.4 | 1985 | 1.4 | 1986 | 1.4 |
| 1976 | 1.6 | 1977 | 1.6 | 1978 | 1.6 | 1979 | 1.6 | 1980 | 1.3 | 1981 | 1.3 | 1982 | 1.3 | 1983 | 1.3 | 1984 | 1.3 | 1985 | 1.3 | 1986 | 1.3 | 1987 | 1.3 |
| 1977 | 1.5 | 1978 | 1.5 | 1979 | 1.5 | 1980 | 1.3 | 1981 | 1.3 | 1982 | 1.3 | 1983 | 1.3 | 1984 | 1.3 | 1985 | 1.3 | 1986 | 1.3 | 1987 | 1.3 | 1988 | 1.3 |
| 1978 | 1.4 | 1979 | 1.4 | 1980 | 1.2 | 1981 | 1.2 | 1982 | 1.2 | 1983 | 1.2 | 1984 | 1.2 | 1985 | 1.2 | 1986 | 1.2 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 |
| 1979 | 1.3 | 1980 | 1.2 | 1981 | 1.2 | 1982 | 1.2 | 1983 | 1.2 | 1984 | 1.2 | 1985 | 1.2 | 1986 | 1.2 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 |
| 1980 | 1.2 | 1981 | 1.2 | 1982 | 1.2 | 1983 | 1.2 | 1984 | 1.2 | 1985 | 1.2 | 1986 | 1.2 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 | 1991 | 1.2 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 4.7 | 1974 | 4.7 | 1975 | 2.5 | 1976 | 2.5 | 1977 | 2.5 | 1978 | 2.5 | 1979 | 2.5 | 1980 | 1.8 | 1981 | 1.8 | 1982 | 1.8 | 1983 | 1.8 | 1984 | 1.8 |
| 1974 | 4.6 | 1975 | 2.5 | 1976 | 2.5 | 1977 | 2.5 | 1978 | 2.5 | 1979 | 2.5 | 1980 | 1.7 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.7 | 1985 | 1.7 |
| 1975 | 2.5 | 1976 | 2.5 | 1977 | 2.5 | 1978 | 2.5 | 1979 | 2.5 | 1980 | 1.7 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.7 | 1985 | 1.7 | 1986 | 1.7 |
| 1976 | 2.4 | 1977 | 2.4 | 1978 | 2.4 | 1979 | 2.4 | 1980 | 1.7 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.7 | 1985 | 1.7 | 1986 | 1.7 | 1987 | 1.7 |
| 1977 | 2.4 | 1978 | 2.4 | 1979 | 2.4 | 1980 | 1.7 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.7 | 1985 | 1.7 | 1986 | 1.7 | 1987 | 1.7 | 1988 | 1.7 |
| 1978 | 2.3 | 1979 | 2.3 | 1980 | 1.7 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.7 | 1985 | 1.7 | 1986 | 1.7 | 1987 | 1.7 | 1988 | 1.7 | 1989 | 1.7 |
| 1979 | 2.2 | 1980 | 1.6 | 1981 | 1.6 | 1982 | 1.6 | 1983 | 1.6 | 1984 | 1.6 | 1985 | 1.6 | 1986 | 1.6 | 1987 | 1.6 | 1988 | 1.6 | 1989 | 1.6 | 1990 | 1.6 |
| 1980 | 1.6 | 1981 | 1.6 | 1982 | 1.6 | 1983 | 1.6 | 1984 | 1.6 | 1985 | 1.6 | 1986 | 1.6 | 1987 | 1.6 | 1988 | 1.6 | 1989 | 1.6 | 1990 | 1.6 | 1991 | 1.6 |
| 1981 | 1.6 | 1982 | 1.6 | 1983 | 1.6 | 1984 | 1.6 | 1985 | 1.6 | 1986 | 1.6 | 1987 | 1.6 | 1988 | 1.6 | 1989 | 1.6 | 1990 | 1.6 | 1991 | 1.6 | 1992 | 1.6 |
| 1982 | 1.5 | 1983 | 1.5 | 1984 | 1.5 | 1985 | 1.5 | 1986 | 1.5 | 1987 | 1.5 | 1988 | 1.5 | 1989 | 1.5 | 1990 | 1.5 | 1991 | 1.5 | 1992 | 1.5 | 1993 | 1.5 |
| 1983 | 1.5 | 1984 | 1.5 | 1985 | 1.5 | 1986 | 1.5 | 1987 | 1.5 | 1988 | 1.5 | 1989 | 1.5 | 1990 | 1.5 | 1991 | 1.5 | 1992 | 1.5 | 1993 | 1.5 | 1994 | 1.5 |
| 1984 | 1.5 | 1985 | 1.5 | 1986 | 1.5 | 1987 | 1.5 | 1988 | 1.5 | 1989 | 1.5 | 1990 | 1.5 | 1991 | 1.5 | 1992 | 1.5 | 1993 | 1.5 | 1994 | 1.5 | 1995 | 1.5 |
| 1985 | 1.4 | 1986 | 1.4 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 | 1991 | 1.4 | 1992 | 1.4 | 1993 | 1.4 | 1994 | 1.4 | 1995 | 1.4 | 1996 | 1.4 |
| 1986 | 1.4 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 | 1991 | 1.4 | 1992 | 1.4 | 1993 | 1.4 | 1994 | 1.4 | 1995 | 1.4 | 1996 | 1.4 | 1997 | 1.4 |
| 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 | 1991 | 1.4 | 1992 | 1.4 | 1993 | 1.4 | 1994 | 1.4 | 1995 | 1.4 | 1996 | 1.4 | 1997 | 1.4 | 1998 | 1.4 |
| 1988 | 1.3 | 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 | 1993 | 1.3 | 1994 | 1.3 | 1995 | 1.3 | 1996 | 1.3 | 1997 | 1.3 | 1998 | 1.3 | 1999 | 1.3 |
| 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 | 1993 | 1.3 | 1994 | 1.3 | 1995 | 1.3 | 1996 | 1.3 | 1997 | 1.3 | 1998 | 1.3 | 1999 | 1.3 | 2000 | 1.3 |
| 1990 | 1.2 | 1991 | 1.2 | 1992 | 1.2 | 1993 | 1.2 | 1994 | 1.2 | 1995 | 1.2 | 1996 | 1.2 | 1997 | 1.2 | 1998 | 1.2 | 1999 | 1.2 | 2000 | 1.2 | 2001 | 1.2 |
| 1991 | 1.2 | 1992 | 1.2 | 1993 | 1.2 | 1994 | 1.2 | 1995 | 1.2 | 1996 | 1.2 | 1997 | 1.2 | 1998 | 1.2 | 1999 | 1.2 | 2000 | 1.2 | 2001 | 1.2 | 2002 | 1.2 |
| 1992 | 1.2 | 1993 | 1.2 | 1994 | 1.2 | 1995 | 1.2 | 1996 | 1.2 | 1997 | 1.2 | 1998 | 1.2 | 1999 | 1.2 | 2000 | 1.2 | 2001 | 1.2 | 2002 | 1.2 | 2003 | 1.2 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.5.4.

TABLE 1.5.2C

DATE : MAY 25, 1985

### EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
### LIGHT DUTY DIESEL POWERED VEHICLES
### NOx

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 2.1 | 1962 | 2.1 | 1963 | 2.1 | 1964 | 2.1 | 1965 | 2.1 | 1966 | 2.1 | 1967 | 2.1 | 1968 | 2.1 | 1969 | 2.1 | 1970 | 2.1 | 1971 | 2.1 | 1972 | 2.1 |
| 1962 | 2.0 | 1963 | 2.0 | 1964 | 2.0 | 1965 | 2.0 | 1966 | 2.0 | 1967 | 2.0 | 1968 | 2.0 | 1969 | 2.0 | 1970 | 2.0 | 1971 | 2.0 | 1972 | 2.0 | 1973 | 2.0 |
| 1963 | 2.0 | 1964 | 2.0 | 1965 | 2.0 | 1966 | 2.0 | 1967 | 2.0 | 1968 | 2.0 | 1969 | 2.0 | 1970 | 2.0 | 1971 | 2.0 | 1972 | 2.0 | 1973 | 2.0 | 1974 | 2.0 |
| 1964 | 2.0 | 1965 | 2.0 | 1966 | 2.0 | 1967 | 2.0 | 1968 | 2.0 | 1969 | 2.0 | 1970 | 2.0 | 1971 | 2.0 | 1972 | 2.0 | 1973 | 2.0 | 1974 | 2.0 | 1975 | 1.9 |
| 1965 | 2.0 | 1966 | 2.0 | 1967 | 2.0 | 1968 | 2.0 | 1969 | 2.0 | 1970 | 2.0 | 1971 | 2.0 | 1972 | 2.0 | 1973 | 2.0 | 1974 | 2.0 | 1975 | 1.9 | 1976 | 1.9 |
| 1966 | 2.0 | 1967 | 2.0 | 1968 | 2.0 | 1969 | 2.0 | 1970 | 2.0 | 1971 | 2.0 | 1972 | 2.0 | 1973 | 2.0 | 1974 | 2.0 | 1975 | 1.9 | 1976 | 1.9 | 1977 | 1.9 |
| 1967 | 1.9 | 1968 | 1.9 | 1969 | 1.9 | 1970 | 1.9 | 1971 | 1.9 | 1972 | 1.9 | 1973 | 1.9 | 1974 | 1.9 | 1975 | 1.9 | 1976 | 1.9 | 1977 | 1.9 | 1978 | 1.9 |
| 1968 | 1.9 | 1969 | 1.9 | 1970 | 1.9 | 1971 | 1.9 | 1972 | 1.9 | 1973 | 1.9 | 1974 | 1.9 | 1975 | 1.8 | 1976 | 1.8 | 1977 | 1.8 | 1978 | 1.8 | 1979 | 1.8 |
| 1969 | 1.9 | 1970 | 1.9 | 1971 | 1.9 | 1972 | 1.9 | 1973 | 1.9 | 1974 | 1.9 | 1975 | 1.8 | 1976 | 1.8 | 1977 | 1.8 | 1978 | 1.8 | 1979 | 1.8 | 1980 | 1.8 |
| 1970 | 1.8 | 1971 | 1.8 | 1972 | 1.8 | 1973 | 1.8 | 1974 | 1.8 | 1975 | 1.8 | 1976 | 1.8 | 1977 | 1.8 | 1978 | 1.8 | 1979 | 1.8 | 1980 | 1.8 | 1981 | 1.6 |
| 1971 | 1.8 | 1972 | 1.8 | 1973 | 1.8 | 1974 | 1.8 | 1975 | 1.8 | 1976 | 1.8 | 1977 | 1.8 | 1978 | 1.8 | 1979 | 1.8 | 1980 | 1.8 | 1981 | 1.6 | 1982 | 1.6 |
| 1972 | 1.8 | 1973 | 1.8 | 1974 | 1.8 | 1975 | 1.7 | 1976 | 1.7 | 1977 | 1.7 | 1978 | 1.7 | 1979 | 1.7 | 1980 | 1.7 | 1981 | 1.6 | 1982 | 1.6 | 1983 | 1.6 |
| 1973 | 1.7 | 1974 | 1.7 | 1975 | 1.7 | 1976 | 1.7 | 1977 | 1.7 | 1978 | 1.7 | 1979 | 1.7 | 1980 | 1.7 | 1981 | 1.5 | 1982 | 1.5 | 1983 | 1.5 | 1984 | 1.5 |
| 1974 | 1.7 | 1975 | 1.7 | 1976 | 1.7 | 1977 | 1.7 | 1978 | 1.7 | 1979 | 1.7 | 1980 | 1.7 | 1981 | 1.5 | 1982 | 1.5 | 1983 | 1.5 | 1984 | 1.5 | 1985 | 1.1 |
| 1975 | 1.6 | 1976 | 1.6 | 1977 | 1.6 | 1978 | 1.6 | 1979 | 1.6 | 1980 | 1.6 | 1981 | 1.5 | 1982 | 1.5 | 1983 | 1.5 | 1984 | 1.5 | 1985 | 1.0 | 1986 | 1.0 |
| 1976 | 1.6 | 1977 | 1.6 | 1978 | 1.6 | 1979 | 1.6 | 1980 | 1.6 | 1981 | 1.4 | 1982 | 1.4 | 1983 | 1.4 | 1984 | 1.4 | 1985 | 1.0 | 1986 | 1.0 | 1987 | 1.0 |
| 1977 | 1.5 | 1978 | 1.5 | 1979 | 1.5 | 1980 | 1.5 | 1981 | 1.4 | 1982 | 1.4 | 1983 | 1.4 | 1984 | 1.4 | 1985 | 1.0 | 1986 | 1.0 | 1987 | 1.0 | 1988 | 1.0 |
| 1978 | 1.5 | 1979 | 1.5 | 1980 | 1.5 | 1981 | 1.4 | 1982 | 1.4 | 1983 | 1.4 | 1984 | 1.4 | 1985 | 0.9 | 1986 | 0.9 | 1987 | 0.9 | 1988 | 0.9 | 1989 | 0.9 |
| 1979 | 1.4 | 1980 | 1.4 | 1981 | 1.3 | 1982 | 1.3 | 1983 | 1.3 | 1984 | 1.3 | 1985 | 0.9 | 1986 | 0.9 | 1987 | 0.9 | 1988 | 0.9 | 1989 | 0.9 | 1990 | 0.9 |
| 1980 | 1.4 | 1981 | 1.3 | 1982 | 1.3 | 1983 | 1.3 | 1984 | 1.3 | 1985 | 0.9 | 1986 | 0.9 | 1987 | 0.9 | 1988 | 0.9 | 1989 | 0.9 | 1990 | 0.9 | 1991 | 0.9 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 2.1 | 1974 | 2.1 | 1975 | 2.0 | 1976 | 2.0 | 1977 | 2.0 | 1978 | 2.0 | 1979 | 2.0 | 1980 | 2.0 | 1981 | 1.8 | 1982 | 1.8 | 1983 | 1.8 | 1984 | 1.8 |
| 1974 | 2.0 | 1975 | 2.0 | 1976 | 2.0 | 1977 | 2.0 | 1978 | 2.0 | 1979 | 2.0 | 1980 | 2.0 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.7 | 1985 | 1.3 |
| 1975 | 2.0 | 1976 | 2.0 | 1977 | 2.0 | 1978 | 2.0 | 1979 | 2.0 | 1980 | 2.0 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.7 | 1985 | 1.3 | 1986 | 1.3 |
| 1976 | 1.9 | 1977 | 1.9 | 1978 | 1.9 | 1979 | 1.9 | 1980 | 1.9 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.7 | 1985 | 1.3 | 1986 | 1.3 | 1987 | 1.3 |
| 1977 | 1.9 | 1978 | 1.9 | 1979 | 1.9 | 1980 | 1.9 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.7 | 1985 | 1.3 | 1986 | 1.3 | 1987 | 1.3 | 1988 | 1.3 |
| 1978 | 1.9 | 1979 | 1.9 | 1980 | 1.9 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.7 | 1985 | 1.2 | 1986 | 1.2 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 |
| 1979 | 1.9 | 1980 | 1.9 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.7 | 1985 | 1.2 | 1986 | 1.2 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 |
| 1980 | 1.8 | 1981 | 1.6 | 1982 | 1.6 | 1983 | 1.6 | 1984 | 1.6 | 1985 | 1.2 | 1986 | 1.2 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 | 1991 | 1.2 |
| 1981 | 1.6 | 1982 | 1.6 | 1983 | 1.6 | 1984 | 1.6 | 1985 | 1.2 | 1986 | 1.2 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 | 1991 | 1.2 | 1992 | 1.2 |
| 1982 | 1.6 | 1983 | 1.6 | 1984 | 1.6 | 1985 | 1.2 | 1986 | 1.2 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 | 1991 | 1.2 | 1992 | 1.2 | 1993 | 1.2 |
| 1983 | 1.6 | 1984 | 1.6 | 1985 | 1.1 | 1986 | 1.1 | 1987 | 1.1 | 1988 | 1.1 | 1989 | 1.1 | 1990 | 1.1 | 1991 | 1.1 | 1992 | 1.1 | 1993 | 1.1 | 1994 | 1.1 |
| 1984 | 1.6 | 1985 | 1.1 | 1986 | 1.1 | 1987 | 1.1 | 1988 | 1.1 | 1989 | 1.1 | 1990 | 1.1 | 1991 | 1.1 | 1992 | 1.1 | 1993 | 1.1 | 1994 | 1.1 | 1995 | 1.1 |
| 1985 | 1.1 | 1986 | 1.1 | 1987 | 1.1 | 1988 | 1.1 | 1989 | 1.1 | 1990 | 1.1 | 1991 | 1.1 | 1992 | 1.1 | 1993 | 1.1 | 1994 | 1.1 | 1995 | 1.1 | 1996 | 1.1 |
| 1986 | 1.1 | 1987 | 1.1 | 1988 | 1.1 | 1989 | 1.1 | 1990 | 1.1 | 1991 | 1.1 | 1992 | 1.1 | 1993 | 1.1 | 1994 | 1.1 | 1995 | 1.1 | 1996 | 1.1 | 1997 | 1.1 |
| 1987 | 1.0 | 1988 | 1.0 | 1989 | 1.0 | 1990 | 1.0 | 1991 | 1.0 | 1992 | 1.0 | 1993 | 1.0 | 1994 | 1.0 | 1995 | 1.0 | 1996 | 1.0 | 1997 | 1.0 | 1998 | 1.0 |
| 1988 | 1.0 | 1989 | 1.0 | 1990 | 1.0 | 1991 | 1.0 | 1992 | 1.0 | 1993 | 1.0 | 1994 | 1.0 | 1995 | 1.0 | 1996 | 1.0 | 1997 | 1.0 | 1998 | 1.0 | 1999 | 1.0 |
| 1989 | 1.0 | 1990 | 1.0 | 1991 | 1.0 | 1992 | 1.0 | 1993 | 1.0 | 1994 | 1.0 | 1995 | 1.0 | 1996 | 1.0 | 1997 | 1.0 | 1998 | 1.0 | 1999 | 1.0 | 2000 | 1.0 |
| 1990 | 0.9 | 1991 | 0.9 | 1992 | 0.9 | 1993 | 0.9 | 1994 | 0.9 | 1995 | 0.9 | 1996 | 0.9 | 1997 | 0.9 | 1998 | 0.9 | 1999 | 0.9 | 2000 | 0.9 | 2001 | 0.9 |
| 1991 | 0.9 | 1992 | 0.9 | 1993 | 0.9 | 1994 | 0.9 | 1995 | 0.9 | 1996 | 0.9 | 1997 | 0.9 | 1998 | 0.9 | 1999 | 0.9 | 2000 | 0.9 | 2001 | 0.9 | 2002 | 0.9 |
| 1992 | 0.9 | 1993 | 0.9 | 1994 | 0.9 | 1995 | 0.9 | 1996 | 0.9 | 1997 | 0.9 | 1998 | 0.9 | 1999 | 0.9 | 2000 | 0.9 | 2001 | 0.9 | 2002 | 0.9 | 2003 | 0.9 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.5.4.

## TABLE 1.5.3

## IDLE EMISSION RATES FOR LOW ALTITUDE LIGHT DUTY DIESEL POWERED VEHICLES

* IER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Min.) | Deterioration Rate (Gm/Min/10K Mi) |
|---|---|---|---|
| HC | Pre-1975 | 0.14 | 0.01 |
| | 1975-1976 | 0.03 | 0.0 |
| | 1977 | 0.04 | 0.0 |
| | 1978 | 0.06 | 0.0 |
| | 1979 | 0.05 | 0.0 |
| | 1980+ | 0.03 | 0.0 |
| CO | Pre-1975 | 0.23 | 0.01 |
| | 1975-1976 | 0.14 | 0.01 |
| | 1977 | 0.16 | 0.01 |
| | 1978 | 0.17 | 0.01 |
| | 1979 | 0.18 | 0.01 |
| | 1980+ | 0.15 | 0.01 |
| NOx | Pre-1975 | 0.13 | 0.0 |
| | 1975-1976 | 0.22 | 0.0 |
| | 1977 | 0.17 | 0.01 |
| | 1978 | 0.20 | 0.01 |
| | 1979 | 0.18 | 0.01 |
| | 1980 | 0.19 | 0.01 |
| | 1981-1984 | 0.14 | 0.01 |
| | 1985+ | 0.09 | 0.01 |

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

DATE : MAY 25, 1985

## TABLE 1.5.4

## REGISTRATION MIX AND MILEAGE ACCUMULATION RATES FOR LOW ALTITUDE LIGHT DUTY DIESEL POWERED VEHICLES

| Model Year Index** | July 1 Registration Mix* | Mileage Accumulation Rate per vehicle* | Jan 1 Registration Mix | Jan 1 Mileage Accumulation Rate (fleet) | Jan 1 Mileage Accumulation (fleet) |
|---|---|---|---|---|---|
| 1 | 0.080 | 12818. | 0.027 | 12818. | 1602. |
| 2 | 0.101 | 12102. | 0.101 | 12639. | 9591. |
| 3 | 0.095 | 11427. | 0.095 | 11933. | 21873. |
| 4 | 0.089 | 10789. | 0.089 | 11267. | 33470. |
| 5 | 0.083 | 10187. | 0.083 | 10638. | 44420. |
| 6 | 0.077 | 9619. | 0.077 | 10045. | 54758. |
| 7 | 0.071 | 9082. | 0.071 | 9485. | 64520. |
| 8 | 0.065 | 8575. | 0.065 | 8955. | 73738. |
| 9 | 0.059 | 8096. | 0.059 | 8455. | 82440. |
| 10 | 0.053 | 7645. | 0.053 | 7983. | 90657. |
| 11 | 0.047 | 7218. | 0.047 | 7538. | 98415. |
| 12 | 0.041 | 6815. | 0.041 | 7117. | 105740. |
| 13 | 0.035 | 6435. | 0.035 | 6720. | 112657. |
| 14 | 0.029 | 6076. | 0.029 | 6345. | 119187. |
| 15 | 0.023 | 5737. | 0.023 | 5991. | 125354. |
| 16 | 0.017 | 5416. | 0.017 | 5657. | 131176. |
| 17 | 0.011 | 5114. | 0.011 | 5340. | 136673. |
| 18 | 0.008 | 4829. | 0.008 | 5043. | 141863. |
| 19 | 0.006 | 4559. | 0.006 | 4761. | 146763. |
| 20+ | 0.008 | 4305. | 0.008 | 4495. | 151390. |

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

DATE : MAY 25, 1985

## TABLE 1.5.5

## EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR LOW ALTITUDE LIGHT DUTY DIESEL POWERED VEHICLES JANUARY 1, 1988

| Model Years | (A) LDV Fleet Registration | (B) Sales Fraction | (A*B) | (C=A*B/DAF) LDDV Registration | (D) Annual Mileage Accrual Rate | (C*D) | (C*D/TFNORM) Travel Fractions |
|---|---|---|---|---|---|---|---|
| 1988 | 0.027 | 0.090 | 0.002 | 0.055 | 12818. | 701.6 | 0.065 |
| 1987 | 0.101 | 0.080 | 0.008 | 0.184 | 12639. | 2328.9 | 0.214 |
| 1986 | 0.095 | 0.073 | 0.007 | 0.158 | 11933. | 1887.3 | 0.174 |
| 1985 | 0.089 | 0.066 | 0.006 | 0.134 | 11267. | 1509.4 | 0.139 |
| 1984 | 0.083 | 0.060 | 0.005 | 0.114 | 10638. | 1208.2 | 0.111 |
| 1983 | 0.077 | 0.053 | 0.004 | 0.093 | 10045. | 934.9 | 0.086 |
| 1982 | 0.071 | 0.046 | 0.003 | 0.074 | 9485. | 706.4 | 0.065 |
| 1981 | 0.065 | 0.061 | 0.004 | 0.090 | 8955. | 809.8 | 0.074 |
| 1980 | 0.059 | 0.034 | 0.002 | 0.046 | 8455. | 386.8 | 0.036 |
| 1979 | 0.053 | 0.028 | 0.001 | 0.034 | 7983. | 270.2 | 0.025 |
| 1978 | 0.047 | 0.009 | 0.000 | 0.010 | 7538. | 72.7 | 0.007 |
| 1977 | 0.041 | 0.004 | 0.000 | 0.004 | 7117. | 26.6 | 0.002 |
| 1976 | 0.035 | 0.003 | 0.000 | 0.002 | 6720. | 16.1 | 0.001 |
| 1975 | 0.029 | 0.003 | 0.000 | 0.002 | 6345. | 12.6 | 0.001 |
| 1974 | 0.023 | 0.0 | 0.0 | 0.0 | 5991. | 0.0 | 0.0 |
| 1973 | 0.017 | 0.0 | 0.0 | 0.0 | 5657. | 0.0 | 0.0 |
| 1972 | 0.011 | 0.0 | 0.0 | 0.0 | 5340. | 0.0 | 0.0 |
| 1971 | 0.008 | 0.0 | 0.0 | 0.0 | 5043. | 0.0 | 0.0 |
| 1970 | 0.006 | 0.0 | 0.0 | 0.0 | 4761. | 0.0 | 0.0 |
| 1969- | 0.008 | 0.0 | 0.0 | 0.0 | 4495. | 0.0 | 0.0 |
| | | DAF: | 0.044 | | TFNORM: | 10871.3 | |

WHERE :

A = January 1 registration mix from Table 1.5.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 1.5.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI)= .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

NOTE : In general, the travel weighting fractions will change for every calendar year since the sales fraction (column B) changes for almost every model year.

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# TABLE 1.5.6

## SPEED CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE LIGHT DUTY DIESEL POWERED VEHICLES

$$* \ SCF(s,sadj) = SF(s)/SF(sadj)$$

$$SF(s) = EXP(A + B*s + C*s^2)$$

| Pol | Model Years | Coefficients A | B | C |
|---|---|---|---|---|
| HC | All | 0.90900 | -0.05500 | 0.00044 |
| CO | All | 1.37520 | -0.08800 | 0.00091 |
| NOx | All | 0.66800 | -0.04800 | 0.00071 |

* WHERE :

s = average speed (mph)

sadj = basic test procedure speed; adjusted for fraction of cold start operation x and fraction of hot start operation w, [ $1/sadj = (w+x)/26 + (1-w-x)/16$ ]

DATE : MAY 25, 1985

## TABLE 1.5.7

### NORMALIZED BAG FRACTIONS FOR LOW ALTITUDE LIGHT DUTY DIESEL POWERED VEHICLES

| | | Normalized Fractions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Model | Test Seg.#1 | | Test Seg.#2 | | Test Seg.#3 | | Total Test | |
| Pol | Years | B1 | D1 | B2 | D2 | B3 | D3 | B0 | D0 |
| HC | Pre-1975 | 1.209 | 0.071 | 1.073 | 0.056 | 0.703 | 0.064 | 1.000 | 0.061 |
| | 1975-1976 | 1.209 | 0.105 | 1.073 | 0.084 | 0.703 | 0.088 | 1.000 | 0.098 |
| | 1977 | 1.209 | 0.105 | 1.073 | 0.084 | 0.703 | 0.088 | 1.000 | 0.098 |
| | 1978 | 1.209 | 0.105 | 1.073 | 0.084 | 0.703 | 0.088 | 1.000 | 0.098 |
| | 1979 | 1.209 | 0.105 | 1.073 | 0.084 | 0.703 | 0.088 | 1.000 | 0.098 |
| | 1980+ | 1.345 | 0.103 | 0.966 | 0.138 | 0.793 | 0.103 | 1.000 | 0.138 |
| CO | Pre-1975 | 1.199 | 0.060 | 0.935 | 0.042 | 0.974 | 0.051 | 1.000 | 0.048 |
| | 1975-1976 | 1.199 | 0.067 | 0.935 | 0.048 | 0.974 | 0.057 | 1.000 | 0.054 |
| | 1977 | 1.199 | 0.067 | 0.935 | 0.048 | 0.974 | 0.057 | 1.000 | 0.054 |
| | 1978 | 1.199 | 0.067 | 0.935 | 0.048 | 0.974 | 0.057 | 1.000 | 0.054 |
| | 1979 | 1.199 | 0.067 | 0.935 | 0.048 | 0.974 | 0.057 | 1.000 | 0.054 |
| | 1980+ | 1.157 | 0.061 | 1.000 | 0.026 | 0.904 | 0.035 | 1.000 | 0.035 |
| NOx | Pre-1975 | 1.068 | 0.026 | 0.981 | 0.029 | 0.985 | 0.026 | 1.000 | 0.028 |
| | 1975-1976 | 1.068 | 0.031 | 0.981 | 0.033 | 0.985 | 0.030 | 1.000 | 0.032 |
| | 1977 | 1.068 | 0.031 | 0.981 | 0.033 | 0.985 | 0.030 | 1.000 | 0.032 |
| | 1978 | 1.068 | 0.031 | 0.981 | 0.033 | 0.985 | 0.030 | 1.000 | 0.032 |
| | 1979 | 1.068 | 0.031 | 0.981 | 0.033 | 0.985 | 0.030 | 1.000 | 0.032 |
| | 1980 | 0.969 | 0.031 | 1.062 | 0.047 | 0.906 | 0.031 | 1.000 | 0.039 |
| | 1981-1982 | 0.969 | 0.031 | 1.062 | 0.047 | 0.906 | 0.031 | 1.000 | 0.039 |
| | 1983+ | 0.969 | 0.031 | 1.062 | 0.047 | 0.906 | 0.031 | 1.000 | 0.039 |

NOTE : The fractions given in this table are used in the calculation of the operating-mode/ temperature correction factor (OMTCF).

WHERE : OMTCF = ((TERM1 + TERM2 + TERM3)/DENOM)
TERM1 = W *TCF(1)*(B1+D1*M)
TERM2 = (1-W-X)*TCF(2)*(B2+D2*M)
TERM3 = X *TCF(3)*(B3+D3*M)
DENOM = B0 + D0*M
W = Fraction of VMT in the cold start mode
X = Fraction of VMT in the hot start mode
TCF(b) = Temperature correction factor for pollutant, model year; for test segment b
M = Cumulative mileage / 10,000

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# TABLE 1.6.1

## EXHAUST EMISSION RATES FOR LOW ALTITUDE LIGHT DUTY DIESEL POWERED TRUCKS (RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Mile) | Deterioration Rate (Gm/Mi/10K Mi) | 50,000 Mile Emission Level (Grams/Mile) |
|---|---|---|---|---|
| HC | Pre-1978 | 0.86 | 0.08 | 1.26 |
| | 1978-1980 | 0.86 | 0.08 | 1.26 |
| | 1981+ | 0.43 | 0.04 | 0.63 |
| CO | Pre-1978 | 1.97 | 0.10 | 2.47 |
| | 1978-1980 | 1.97 | 0.10 | 2.47 |
| | 1981+ | 1.33 | 0.04 | 1.53 |
| NOx | Pre-1978 | 1.83 | 0.08 | 2.23 |
| | 1978-1980 | 1.83 | 0.08 | 2.23 |
| | 1981-1986 | 1.48 | 0.03 | 1.63 |
| | 1987+ | 0.94 | 0.03 | 1.09 |

* WHERE :
BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

DATE : MAY 25, 1985

TABLE 1.6.2A

DATE : MAY 25, 1985

## EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
## LIGHT DUTY DIESEL POWERED TRUCKS
## TOTAL HC

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 2.3 | 1962 | 2.3 | 1963 | 2.3 | 1964 | 2.3 | 1965 | 2.3 | 1966 | 2.3 | 1967 | 2.3 | 1968 | 2.3 | 1969 | 2.3 | 1970 | 2.3 | 1971 | 2.3 | 1972 | 2.3 |
| 1962 | 2.3 | 1963 | 2.3 | 1964 | 2.3 | 1965 | 2.3 | 1966 | 2.3 | 1967 | 2.3 | 1968 | 2.3 | 1969 | 2.3 | 1970 | 2.3 | 1971 | 2.3 | 1972 | 2.3 | 1973 | 2.3 |
| 1963 | 2.2 | 1964 | 2.2 | 1965 | 2.2 | 1966 | 2.2 | 1967 | 2.2 | 1968 | 2.2 | 1969 | 2.2 | 1970 | 2.2 | 1971 | 2.2 | 1972 | 2.2 | 1973 | 2.2 | 1974 | 2.2 |
| 1964 | 2.2 | 1965 | 2.2 | 1966 | 2.2 | 1967 | 2.2 | 1968 | 2.2 | 1969 | 2.2 | 1970 | 2.2 | 1971 | 2.2 | 1972 | 2.2 | 1973 | 2.2 | 1974 | 2.2 | 1975 | 2.2 |
| 1965 | 2.1 | 1966 | 2.1 | 1967 | 2.1 | 1968 | 2.1 | 1969 | 2.1 | 1970 | 2.1 | 1971 | 2.1 | 1972 | 2.1 | 1973 | 2.1 | 1974 | 2.1 | 1975 | 2.1 | 1976 | 2.1 |
| 1966 | 2.1 | 1967 | 2.1 | 1968 | 2.1 | 1969 | 2.1 | 1970 | 2.1 | 1971 | 2.1 | 1972 | 2.1 | 1973 | 2.1 | 1974 | 2.1 | 1975 | 2.1 | 1976 | 2.1 | 1977 | 2.1 |
| 1967 | 2.0 | 1968 | 2.0 | 1969 | 2.0 | 1970 | 2.0 | 1971 | 2.0 | 1972 | 2.0 | 1973 | 2.0 | 1974 | 2.0 | 1975 | 2.0 | 1976 | 2.0 | 1977 | 2.0 | 1978 | 2.0 |
| 1968 | 2.0 | 1969 | 2.0 | 1970 | 2.0 | 1971 | 2.0 | 1972 | 2.0 | 1973 | 2.0 | 1974 | 2.0 | 1975 | 2.0 | 1976 | 2.0 | 1977 | 2.0 | 1978 | 2.0 | 1979 | 2.0 |
| 1969 | 1.9 | 1970 | 1.9 | 1971 | 1.9 | 1972 | 1.9 | 1973 | 1.9 | 1974 | 1.9 | 1975 | 1.9 | 1976 | 1.9 | 1977 | 1.9 | 1978 | 1.9 | 1979 | 1.9 | 1980 | 1.9 |
| 1970 | 1.9 | 1971 | 1.9 | 1972 | 1.9 | 1973 | 1.9 | 1974 | 1.9 | 1975 | 1.9 | 1976 | 1.9 | 1977 | 1.9 | 1978 | 1.9 | 1979 | 1.9 | 1980 | 1.9 | 1981 | 0.9 |
| 1971 | 1.8 | 1972 | 1.8 | 1973 | 1.8 | 1974 | 1.8 | 1975 | 1.8 | 1976 | 1.8 | 1977 | 1.8 | 1978 | 1.8 | 1979 | 1.8 | 1980 | 1.8 | 1981 | 0.9 | 1982 | 0.9 |
| 1972 | 1.7 | 1973 | 1.7 | 1974 | 1.7 | 1975 | 1.7 | 1976 | 1.7 | 1977 | 1.7 | 1978 | 1.7 | 1979 | 1.7 | 1980 | 1.7 | 1981 | 0.9 | 1982 | 0.9 | 1983 | 0.9 |
| 1973 | 1.6 | 1974 | 1.6 | 1975 | 1.6 | 1976 | 1.6 | 1977 | 1.6 | 1978 | 1.6 | 1979 | 1.6 | 1980 | 1.6 | 1981 | 0.8 | 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.8 |
| 1974 | 1.5 | 1975 | 1.5 | 1976 | 1.5 | 1977 | 1.5 | 1978 | 1.5 | 1979 | 1.5 | 1980 | 1.5 | 1981 | 0.8 | 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.8 | 1985 | 0.8 |
| 1975 | 1.4 | 1976 | 1.4 | 1977 | 1.4 | 1978 | 1.4 | 1979 | 1.4 | 1980 | 1.4 | 1981 | 0.7 | 1982 | 0.7 | 1983 | 0.7 | 1984 | 0.7 | 1985 | 0.7 | 1986 | 0.7 |
| 1976 | 1.3 | 1977 | 1.3 | 1978 | 1.3 | 1979 | 1.3 | 1980 | 1.3 | 1981 | 0.7 | 1982 | 0.7 | 1983 | 0.7 | 1984 | 0.7 | 1985 | 0.7 | 1986 | 0.7 | 1987 | 0.7 |
| 1977 | 1.2 | 1978 | 1.2 | 1979 | 1.2 | 1980 | 1.2 | 1981 | 0.6 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 |
| 1978 | 1.1 | 1979 | 1.1 | 1980 | 1.1 | 1981 | 0.5 | 1982 | 0.5 | 1983 | 0.5 | 1984 | 0.5 | 1985 | 0.5 | 1986 | 0.5 | 1987 | 0.5 | 1988 | 0.5 | 1989 | 0.5 |
| 1979 | 1.0 | 1980 | 1.0 | 1981 | 0.5 | 1982 | 0.5 | 1983 | 0.5 | 1984 | 0.5 | 1985 | 0.5 | 1986 | 0.5 | 1987 | 0.5 | 1988 | 0.5 | 1989 | 0.5 | 1990 | 0.5 |
| 1980 | 0.9 | 1981 | 0.4 | 1982 | 0.4 | 1983 | 0.4 | 1984 | 0.4 | 1985 | 0.4 | 1986 | 0.4 | 1987 | 0.4 | 1988 | 0.4 | 1989 | 0.4 | 1990 | 0.4 | 1931 | 0.4 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 2.3 | 1974 | 2.3 | 1975 | 2.3 | 1976 | 2.3 | 1977 | 2.3 | 1978 | 2.3 | 1979 | 2.3 | 1980 | 2.3 | 1981 | 1.2 | 1982 | 1.2 | 1983 | 1.2 | 1984 | 1.2 |
| 1974 | 2.3 | 1975 | 2.3 | 1976 | 2.3 | 1977 | 2.3 | 1978 | 2.3 | 1979 | 2.3 | 1980 | 2.3 | 1981 | 1.1 | 1982 | 1.1 | 1983 | 1.1 | 1984 | 1.1 | 1985 | 1.1 |
| 1975 | 2.2 | 1976 | 2.2 | 1977 | 2.2 | 1978 | 2.2 | 1979 | 2.2 | 1980 | 2.2 | 1981 | 1.1 | 1982 | 1.1 | 1983 | 1.1 | 1984 | 1.1 | 1985 | 1.1 | 1986 | 1.1 |
| 1976 | 2.2 | 1977 | 2.2 | 1978 | 2.2 | 1979 | 2.2 | 1980 | 2.2 | 1981 | 1.1 | 1982 | 1.1 | 1983 | 1.1 | 1984 | 1.1 | 1985 | 1.1 | 1986 | 1.1 | 1987 | 1.1 |
| 1977 | 2.1 | 1978 | 2.1 | 1979 | 2.1 | 1980 | 2.1 | 1981 | 1.1 | 1982 | 1.1 | 1983 | 1.1 | 1984 | 1.1 | 1985 | 1.1 | 1986 | 1.1 | 1987 | 1.1 | 1988 | 1.1 |
| 1978 | 2.1 | 1979 | 2.1 | 1980 | 2.1 | 1981 | 1.0 | 1982 | 1.0 | 1983 | 1.0 | 1984 | 1.0 | 1985 | 1.0 | 1986 | 1.0 | 1987 | 1.0 | 1988 | 1.0 | 1989 | 1.0 |
| 1979 | 2.0 | 1980 | 2.0 | 1981 | 1.0 | 1982 | 1.0 | 1983 | 1.0 | 1984 | 1.0 | 1985 | 1.0 | 1986 | 1.0 | 1987 | 1.0 | 1988 | 1.0 | 1989 | 1.0 | 1990 | 1.0 |
| 1980 | 2.0 | 1981 | 1.0 | 1982 | 1.0 | 1983 | 1.0 | 1984 | 1.0 | 1985 | 1.0 | 1986 | 1.0 | 1987 | 1.0 | 1988 | 1.0 | 1989 | 1.0 | 1990 | 1.0 | 1991 | 1.0 |
| 1981 | 1.0 | 1982 | 1.0 | 1983 | 1.0 | 1984 | 1.0 | 1985 | 1.0 | 1986 | 1.0 | 1987 | 1.0 | 1988 | 1.0 | 1989 | 1.0 | 1990 | 1.0 | 1991 | 1.0 | 1992 | 1.0 |
| 1982 | 0.9 | 1983 | 0.9 | 1984 | 0.9 | 1985 | 0.9 | 1986 | 0.9 | 1987 | 0.9 | 1988 | 0.9 | 1989 | 0.9 | 1990 | 0.9 | 1991 | 0.9 | 1992 | 0.9 | 1993 | 0.9 |
| 1983 | 0.9 | 1984 | 0.9 | 1985 | 0.9 | 1986 | 0.9 | 1987 | 0.9 | 1988 | 0.9 | 1989 | 0.9 | 1990 | 0.9 | 1991 | 0.9 | 1992 | 0.9 | 1993 | 0.9 | 1994 | 0.9 |
| 1984 | 0.9 | 1985 | 0.9 | 1986 | 0.9 | 1987 | 0.9 | 1988 | 0.9 | 1989 | 0.9 | 1990 | 0.9 | 1991 | 0.9 | 1992 | 0.9 | 1993 | 0.9 | 1994 | 0.9 | 1995 | 0.9 |
| 1985 | 0.8 | 1986 | 0.8 | 1987 | 0.8 | 1988 | 0.8 | 1989 | 0.8 | 1990 | 0.8 | 1991 | 0.8 | 1992 | 0.8 | 1993 | 0.8 | 1994 | 0.8 | 1995 | 0.8 | 1996 | 0.8 |
| 1986 | 0.8 | 1987 | 0.8 | 1988 | 0.8 | 1989 | 0.8 | 1990 | 0.8 | 1991 | 0.8 | 1992 | 0.6 | 1993 | 0.8 | 1994 | 0.8 | 1995 | 0.8 | 1996 | 0.8 | 1997 | 0.8 |
| 1987 | 0.7 | 1988 | 0.7 | 1989 | 0.7 | 1990 | 0.7 | 1991 | 0.7 | 1992 | 0.7 | 1993 | 0.7 | 1994 | 0.7 | 1995 | 0.7 | 1996 | 0.7 | 1997 | 0.7 | 1998 | 0.7 |
| 1988 | 0.7 | 1989 | 0.7 | 1990 | 0.7 | 1991 | 0.7 | 1992 | 0.7 | 1993 | 0.7 | 1994 | 0.7 | 1995 | 0.7 | 1996 | 0.7 | 1997 | 0.7 | 1998 | 0.7 | 1999 | 0.7 |
| 1989 | 0.6 | 1990 | 0.6 | 1991 | 0.6 | 1992 | 0.6 | 1993 | 0.6 | 1994 | 0.6 | 1995 | 0.6 | 1996 | 0.6 | 1997 | 0.6 | 1998 | 0.6 | 1999 | 0.6 | 2000 | 0.6 |
| 1990 | 0.5 | 1991 | 0.5 | 1992 | 0.5 | 1993 | 0.5 | 1994 | 0.5 | 1995 | 0.5 | 1996 | 0.5 | 1997 | 0.5 | 1998 | 0.5 | 1999 | 0.5 | 2000 | 0.5 | 2001 | 0.5 |
| 1991 | 0.5 | 1992 | 0.5 | 1993 | 0.5 | 1994 | 0.5 | 1995 | 0.5 | 1996 | 0.5 | 1997 | 0.5 | 1998 | 0.5 | 1999 | 0.5 | 2000 | 0.5 | 2001 | 0.5 | 2002 | 0.5 |
| 1992 | 0.4 | 1993 | 0.4 | 1994 | 0.4 | 1995 | 0.4 | 1996 | 0.4 | 1997 | 0.4 | 1998 | 0.4 | 1999 | 0.4 | 2000 | 0.4 | 2001 | 0.4 | 2002 | 0.4 | 2003 | 0.4 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.6.4.

TABLE 1.6.2B

DATE : MAY 25, 1985

# EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
# LIGHT DUTY DIESEL POWERED TRUCKS
# CO

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 3.8 | 1962 | 3.8 | 1963 | 3.8 | 1964 | 3.8 | 1965 | 3.8 | 1966 | 3.8 | 1967 | 3.8 | 1968 | 3.8 | 1969 | 3.8 | 1970 | 3.8 | 1971 | 3.8 | 1972 | 3.8 |
| 1962 | 3.7 | 1963 | 3.7 | 1964 | 3.7 | 1965 | 3.7 | 1966 | 3.7 | 1967 | 3.7 | 1968 | 3.7 | 1969 | 3.7 | 1970 | 3.7 | 1971 | 3.7 | 1972 | 3.7 | 1973 | 3.7 |
| 1963 | 3.7 | 1964 | 3.7 | 1965 | 3.7 | 1966 | 3.7 | 1967 | 3.7 | 1968 | 3.7 | 1969 | 3.7 | 1970 | 3.7 | 1971 | 3.7 | 1972 | 3.7 | 1973 | 3.7 | 1974 | 3.7 |
| 1964 | 3.6 | 1965 | 3.6 | 1966 | 3.6 | 1967 | 3.6 | 1968 | 3.6 | 1969 | 3.6 | 1970 | 3.6 | 1971 | 3.6 | 1972 | 3.6 | 1973 | 3.6 | 1974 | 3.6 | 1975 | 3.6 |
| 1965 | 3.6 | 1966 | 3.6 | 1967 | 3.6 | 1968 | 3.6 | 1969 | 3.6 | 1970 | 3.6 | 1971 | 3.6 | 1972 | 3.6 | 1973 | 3.6 | 1974 | 3.6 | 1975 | 3.6 | 1976 | 3.6 |
| 1966 | 3.5 | 1967 | 3.5 | 1968 | 3.5 | 1969 | 3.5 | 1970 | 3.5 | 1971 | 3.5 | 1972 | 3.5 | 1973 | 3.5 | 1974 | 3.5 | 1975 | 3.5 | 1976 | 3.5 | 1977 | 3.5 |
| 1967 | 3.5 | 1968 | 3.5 | 1969 | 3.5 | 1970 | 3.5 | 1971 | 3.5 | 1972 | 3.5 | 1973 | 3.5 | 1974 | 3.5 | 1975 | 3.5 | 1976 | 3.5 | 1977 | 3.5 | 1978 | 3.5 |
| 1968 | 3.4 | 1969 | 3.4 | 1970 | 3.4 | 1971 | 3.4 | 1972 | 3.4 | 1973 | 3.4 | 1974 | 3.4 | 1975 | 3.4 | 1976 | 3.4 | 1977 | 3.4 | 1978 | 3.4 | 1979 | 3.4 |
| 1969 | 3.3 | 1970 | 3.3 | 1971 | 3.3 | 1972 | 3.3 | 1973 | 3.3 | 1974 | 3.3 | 1975 | 3.3 | 1976 | 3.3 | 1977 | 3.3 | 1978 | 3.3 | 1979 | 3.3 | 1980 | 3.3 |
| 1970 | 3.2 | 1971 | 3.2 | 1972 | 3.2 | 1973 | 3.2 | 1974 | 3.2 | 1975 | 3.2 | 1976 | 3.2 | 1977 | 3.2 | 1978 | 3.2 | 1979 | 3.2 | 1980 | 3.2 | 1981 | 1.8 |
| 1971 | 3.1 | 1972 | 3.1 | 1973 | 3.1 | 1974 | 3.1 | 1975 | 3.1 | 1976 | 3.1 | 1977 | 3.1 | 1978 | 3.1 | 1979 | 3.1 | 1980 | 3.1 | 1981 | 1.8 | 1982 | 1.8 |
| 1972 | 3.0 | 1973 | 3.0 | 1974 | 3.0 | 1975 | 3.0 | 1976 | 3.0 | 1977 | 3.0 | 1978 | 3.0 | 1979 | 3.0 | 1980 | 3.0 | 1981 | 1.8 | 1982 | 1.8 | 1983 | 1.8 |
| 1973 | 2.9 | 1974 | 2.9 | 1975 | 2.9 | 1976 | 2.9 | 1977 | 2.9 | 1978 | 2.9 | 1979 | 2.9 | 1980 | 2.9 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.7 |
| 1974 | 2.8 | 1975 | 2.8 | 1976 | 2.8 | 1977 | 2.8 | 1978 | 2.8 | 1979 | 2.8 | 1980 | 2.8 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.7 | 1985 | 1.7 |
| 1975 | 2.7 | 1976 | 2.7 | 1977 | 2.7 | 1978 | 2.7 | 1979 | 2.7 | 1980 | 2.7 | 1981 | 1.6 | 1982 | 1.6 | 1983 | 1.6 | 1984 | 1.6 | 1985 | 1.6 | 1986 | 1.6 |
| 1976 | 2.6 | 1977 | 2.6 | 1978 | 2.6 | 1979 | 2.6 | 1980 | 2.6 | 1981 | 1.6 | 1982 | 1.6 | 1983 | 1.6 | 1984 | 1.6 | 1985 | 1.6 | 1986 | 1.6 | 1987 | 1.6 |
| 1977 | 2.4 | 1978 | 2.4 | 1979 | 2.4 | 1980 | 2.4 | 1981 | 1.5 | 1982 | 1.5 | 1983 | 1.5 | 1984 | 1.5 | 1985 | 1.5 | 1986 | 1.5 | 1987 | 1.5 | 1988 | 1.5 |
| 1978 | 2.3 | 1979 | 2.3 | 1980 | 2.3 | 1981 | 1.5 | 1982 | 1.5 | 1983 | 1.5 | 1984 | 1.5 | 1985 | 1.5 | 1986 | 1.5 | 1987 | 1.5 | 1988 | 1.5 | 1989 | 1.5 |
| 1979 | 2.1 | 1980 | 2.1 | 1981 | 1.4 | 1982 | 1.4 | 1983 | 1.4 | 1984 | 1.4 | 1985 | 1.4 | 1986 | 1.4 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 |
| 1980 | 2.0 | 1981 | 1.3 | 1982 | 1.3 | 1983 | 1.3 | 1984 | 1.3 | 1985 | 1.3 | 1986 | 1.3 | 1987 | 1.3 | 1988 | 1.3 | 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 3.8 | 1974 | 3.8 | 1975 | 3.8 | 1976 | 3.8 | 1977 | 3.8 | 1978 | 3.8 | 1979 | 3.8 | 1980 | 3.8 | 1981 | 2.1 | 1982 | 2.1 | 1983 | 2.1 | 1984 | 2.1 |
| 1974 | 3.7 | 1975 | 3.7 | 1976 | 3.7 | 1977 | 3.7 | 1978 | 3.7 | 1979 | 3.7 | 1980 | 3.7 | 1981 | 2.0 | 1982 | 2.0 | 1983 | 2.0 | 1984 | 2.0 | 1985 | 2.0 |
| 1975 | 3.7 | 1976 | 3.7 | 1977 | 3.7 | 1978 | 3.7 | 1979 | 3.7 | 1980 | 3.7 | 1981 | 2.0 | 1982 | 2.0 | 1983 | 2.0 | 1984 | 2.0 | 1985 | 2.0 | 1986 | 2.0 |
| 1976 | 3.6 | 1977 | 3.6 | 1978 | 3.6 | 1979 | 3.6 | 1980 | 3.6 | 1981 | 2.0 | 1982 | 2.0 | 1983 | 2.0 | 1984 | 2.0 | 1985 | 2.0 | 1986 | 2.0 | 1987 | 2.0 |
| 1977 | 3.6 | 1978 | 3.6 | 1979 | 3.6 | 1980 | 3.6 | 1981 | 2.0 | 1982 | 2.0 | 1983 | 2.0 | 1984 | 2.0 | 1985 | 2.0 | 1986 | 2.0 | 1987 | 2.0 | 1988 | 2.0 |
| 1978 | 3.5 | 1979 | 3.5 | 1980 | 3.5 | 1981 | 2.0 | 1982 | 2.0 | 1983 | 2.0 | 1984 | 2.0 | 1985 | 2.0 | 1986 | 2.0 | 1987 | 2.0 | 1988 | 2.0 | 1989 | 2.0 |
| 1979 | 3.5 | 1980 | 3.5 | 1981 | 1.9 | 1982 | 1.9 | 1983 | 1.9 | 1984 | 1.9 | 1985 | 1.9 | 1986 | 1.9 | 1987 | 1.9 | 1988 | 1.9 | 1989 | 1.9 | 1990 | 1.9 |
| 1980 | 3.4 | 1981 | 1.9 | 1982 | 1.9 | 1983 | 1.9 | 1984 | 1.9 | 1985 | 1.9 | 1986 | 1.9 | 1987 | 1.9 | 1988 | 1.9 | 1989 | 1.9 | 1990 | 1.9 | 1991 | 1.9 |
| 1981 | 1.9 | 1982 | 1.9 | 1983 | 1.9 | 1984 | 1.9 | 1985 | 1.9 | 1986 | 1.9 | 1987 | 1.9 | 1988 | 1.9 | 1989 | 1.9 | 1990 | 1.9 | 1991 | 1.9 | 1992 | 1.9 |
| 1982 | 1.8 | 1983 | 1.8 | 1984 | 1.8 | 1985 | 1.8 | 1986 | 1.8 | 1987 | 1.8 | 1988 | 1.8 | 1989 | 1.8 | 1990 | 1.8 | 1991 | 1.8 | 1992 | 1.8 | 1993 | 1.8 |
| 1983 | 1.8 | 1984 | 1.8 | 1985 | 1.8 | 1986 | 1.8 | 1987 | 1.8 | 1988 | 1.8 | 1989 | 1.8 | 1990 | 1.8 | 1991 | 1.8 | 1992 | 1.8 | 1993 | 1.8 | 1994 | 1.8 |
| 1984 | 1.8 | 1985 | 1.8 | 1986 | 1.8 | 1987 | 1.8 | 1988 | 1.8 | 1989 | 1.8 | 1990 | 1.8 | 1991 | 1.8 | 1992 | 1.8 | 1993 | 1.8 | 1994 | 1.8 | 1995 | 1.8 |
| 1985 | 1.7 | 1986 | 1.7 | 1987 | 1.7 | 1988 | 1.7 | 1989 | 1.7 | 1990 | 1.7 | 1991 | 1.7 | 1992 | 1.7 | 1993 | 1.7 | 1994 | 1.7 | 1995 | 1.7 | 1996 | 1.7 |
| 1986 | 1.7 | 1987 | 1.7 | 1988 | 1.7 | 1989 | 1.7 | 1990 | 1.7 | 1991 | 1.7 | 1992 | 1.7 | 1993 | 1.7 | 1994 | 1.7 | 1995 | 1.7 | 1996 | 1.7 | 1997 | 1.7 |
| 1987 | 1.6 | 1988 | 1.6 | 1989 | 1.6 | 1990 | 1.6 | 1991 | 1.6 | 1992 | 1.6 | 1993 | 1.6 | 1994 | 1.6 | 1995 | 1.6 | 1996 | 1.6 | 1997 | 1.6 | 1998 | 1.6 |
| 1988 | 1.6 | 1989 | 1.6 | 1990 | 1.6 | 1991 | 1.6 | 1992 | 1.6 | 1993 | 1.6 | 1994 | 1.6 | 1995 | 1.6 | 1996 | 1.6 | 1997 | 1.6 | 1998 | 1.6 | 1999 | 1.6 |
| 1989 | 1.5 | 1990 | 1.5 | 1991 | 1.5 | 1992 | 1.5 | 1993 | 1.5 | 1994 | 1.5 | 1995 | 1.5 | 1996 | 1.5 | 1997 | 1.5 | 1998 | 1.5 | 1999 | 1.5 | 2000 | 1.5 |
| 1990 | 1.5 | 1991 | 1.5 | 1992 | 1.5 | 1993 | 1.5 | 1994 | 1.5 | 1995 | 1.5 | 1996 | 1.5 | 1997 | 1.5 | 1998 | 1.5 | 1999 | 1.5 | 2000 | 1.5 | 2001 | 1.5 |
| 1991 | 1.4 | 1992 | 1.4 | 1993 | 1.4 | 1994 | 1.4 | 1995 | 1.4 | 1996 | 1.4 | 1997 | 1.4 | 1998 | 1.4 | 1999 | 1.4 | 2000 | 1.4 | 2001 | 1.4 | 2002 | 1.4 |
| 1992 | 1.3 | 1993 | 1.3 | 1994 | 1.3 | 1995 | 1.3 | 1996 | 1.3 | 1997 | 1.3 | 1998 | 1.3 | 1999 | 1.3 | 2000 | 1.3 | 2001 | 1.3 | 2002 | 1.3 | 2003 | 1.3 |

*MY -- Indicates the model year

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.6.4.

TABLE 1.6.2C

DATE : MAY 25, 1985

## EXHAUST EMISSION LEVELS FOR LOW ALTITUDE LIGHT DUTY DIESEL POWERED TRUCKS
## NOx

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 3.3 | 1962 | 3.3 | 1963 | 3.3 | 1964 | 3.3 | 1965 | 3.3 | 1966 | 3.3 | 1967 | 3.3 | 1968 | 3.3 | 1969 | 3.3 | 1970 | 3.3 | 1971 | 3.3 | 1972 | 3.3 |
| 1962 | 3.3 | 1963 | 3.3 | 1964 | 3.3 | 1965 | 3.3 | 1966 | 3.3 | 1967 | 3.3 | 1968 | 3.3 | 1969 | 3.3 | 1970 | 3.3 | 1971 | 3.3 | 1972 | 3.3 | 1973 | 3.3 |
| 1963 | 3.2 | 1964 | 3.2 | 1965 | 3.2 | 1966 | 3.2 | 1967 | 3.2 | 1968 | 3.2 | 1969 | 3.2 | 1970 | 3.2 | 1971 | 3.2 | 1972 | 3.2 | 1973 | 3.2 | 1974 | 3.2 |
| 1964 | 3.2 | 1965 | 3.2 | 1966 | 3.2 | 1967 | 3.2 | 1968 | 3.2 | 1969 | 3.2 | 1970 | 3.2 | 1971 | 3.2 | 1972 | 3.2 | 1973 | 3.2 | 1974 | 3.2 | 1975 | 3.2 |
| 1965 | 3.1 | 1966 | 3.1 | 1967 | 3.1 | 1968 | 3.1 | 1969 | 3.1 | 1970 | 3.1 | 1971 | 3.1 | 1972 | 3.1 | 1973 | 3.1 | 1974 | 3.1 | 1975 | 3.1 | 1976 | 3.1 |
| 1966 | 3.1 | 1967 | 3.1 | 1968 | 3.1 | 1969 | 3.1 | 1970 | 3.1 | 1971 | 3.1 | 1972 | 3.1 | 1973 | 3.1 | 1974 | 3.1 | 1975 | 3.1 | 1976 | 3.1 | 1977 | 3.1 |
| 1967 | 3.0 | 1968 | 3.0 | 1969 | 3.0 | 1970 | 3.0 | 1971 | 3.0 | 1972 | 3.0 | 1973 | 3.0 | 1974 | 3.0 | 1975 | 3.0 | 1976 | 3.0 | 1977 | 3.0 | 1978 | 3.0 |
| 1968 | 3.0 | 1969 | 3.0 | 1970 | 3.0 | 1971 | 3.0 | 1972 | 3.0 | 1973 | 3.0 | 1974 | 3.0 | 1975 | 3.0 | 1976 | 3.0 | 1977 | 3.0 | 1978 | 3.0 | 1979 | 3.0 |
| 1969 | 2.9 | 1970 | 2.9 | 1971 | 2.9 | 1972 | 2.9 | 1973 | 2.9 | 1974 | 2.9 | 1975 | 2.9 | 1976 | 2.9 | 1977 | 2.9 | 1978 | 2.9 | 1979 | 2.9 | 1980 | 2.9 |
| 1970 | 2.8 | 1971 | 2.8 | 1972 | 2.8 | 1973 | 2.8 | 1974 | 2.8 | 1975 | 2.8 | 1976 | 2.8 | 1977 | 2.8 | 1978 | 2.8 | 1979 | 2.8 | 1980 | 2.8 | 1981 | 1.9 |
| 1971 | 2.8 | 1972 | 2.8 | 1973 | 2.8 | 1974 | 2.8 | 1975 | 2.8 | 1976 | 2.8 | 1977 | 2.8 | 1978 | 2.8 | 1979 | 2.8 | 1980 | 2.8 | 1981 | 1.8 | 1982 | 1.8 |
| 1972 | 2.7 | 1973 | 2.7 | 1974 | 2.7 | 1975 | 2.7 | 1976 | 2.7 | 1977 | 2.7 | 1978 | 2.7 | 1979 | 2.7 | 1980 | 2.7 | 1981 | 1.8 | 1982 | 1.8 | 1983 | 1.8 |
| 1973 | 2.6 | 1974 | 2.6 | 1975 | 2.6 | 1976 | 2.6 | 1977 | 2.6 | 1978 | 2.6 | 1979 | 2.6 | 1980 | 2.6 | 1981 | 1.8 | 1982 | 1.8 | 1983 | 1.8 | 1984 | 1.8 |
| 1974 | 2.5 | 1975 | 2.5 | 1976 | 2.5 | 1977 | 2.5 | 1978 | 2.5 | 1979 | 2.5 | 1980 | 2.5 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.7 | 1985 | 1.7 |
| 1975 | 2.4 | 1976 | 2.4 | 1977 | 2.4 | 1978 | 2.4 | 1979 | 2.4 | 1980 | 2.4 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.7 | 1985 | 1.7 | 1986 | 1.7 |
| 1976 | 2.3 | 1977 | 2.3 | 1978 | 2.3 | 1979 | 2.3 | 1980 | 2.3 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.7 | 1985 | 1.7 | 1986 | 1.7 | 1987 | 1.1 |
| 1977 | 2.2 | 1978 | 2.2 | 1979 | 2.2 | 1980 | 2.2 | 1981 | 1.6 | 1982 | 1.6 | 1983 | 1.6 | 1984 | 1.6 | 1985 | 1.6 | 1986 | 1.6 | 1987 | 1.1 | 1988 | 1.1 |
| 1978 | 2.1 | 1979 | 2.1 | 1980 | 2.1 | 1981 | 1.6 | 1982 | 1.6 | 1983 | 1.6 | 1984 | 1.6 | 1985 | 1.6 | 1986 | 1.6 | 1987 | 1.0 | 1988 | 1.0 | 1989 | 1.0 |
| 1979 | 1.9 | 1980 | 1.9 | 1981 | 1.5 | 1982 | 1.5 | 1983 | 1.5 | 1984 | 1.5 | 1985 | 1.5 | 1986 | 1.5 | 1987 | 1.0 | 1988 | 1.0 | 1989 | 1.0 | 1990 | 1.0 |
| 1980 | 1.9 | 1981 | 1.5 | 1982 | 1.5 | 1983 | 1.5 | 1984 | 1.5 | 1985 | 1.5 | 1986 | 1.5 | 1987 | 0.9 | 1988 | 0.9 | 1989 | 0.9 | 1990 | 0.9 | 1991 | 0.9 |

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| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 3.3 | 1974 | 3.3 | 1975 | 3.3 | 1976 | 3.3 | 1977 | 3.3 | 1978 | 3.3 | 1979 | 3.3 | 1980 | 3.3 | 1981 | 2.0 | 1982 | 2.0 | 1983 | 2.0 | 1984 | 2.0 |
| 1974 | 3.3 | 1975 | 3.3 | 1976 | 3.3 | 1977 | 3.3 | 1978 | 3.3 | 1979 | 3.3 | 1980 | 3.3 | 1981 | 2.0 | 1982 | 2.0 | 1983 | 2.0 | 1984 | 2.0 | 1985 | 2.0 |
| 1975 | 3.2 | 1976 | 3.2 | 1977 | 3.2 | 1978 | 3.2 | 1979 | 3.2 | 1980 | 3.2 | 1981 | 2.0 | 1982 | 2.0 | 1983 | 2.0 | 1984 | 2.0 | 1985 | 2.0 | 1986 | 2.0 |
| 1976 | 3.2 | 1977 | 3.2 | 1978 | 3.2 | 1979 | 3.2 | 1980 | 3.2 | 1981 | 2.0 | 1982 | 2.0 | 1983 | 2.0 | 1984 | 2.0 | 1985 | 2.0 | 1986 | 2.0 | 1987 | 1.4 |
| 1977 | 3.1 | 1978 | 3.1 | 1979 | 3.1 | 1980 | 3.1 | 1981 | 2.0 | 1982 | 2.0 | 1983 | 2.0 | 1984 | 2.0 | 1985 | 2.0 | 1986 | 2.0 | 1987 | 1.4 | 1988 | 1.4 |
| 1978 | 3.1 | 1979 | 3.1 | 1980 | 3.1 | 1981 | 2.0 | 1982 | 2.0 | 1983 | 2.0 | 1984 | 2.0 | 1985 | 2.0 | 1986 | 2.0 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 |
| 1979 | 3.0 | 1980 | 3.0 | 1981 | 1.9 | 1982 | 1.9 | 1983 | 1.9 | 1984 | 1.9 | 1985 | 1.9 | 1986 | 1.9 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 |
| 1980 | 3.0 | 1981 | 1.9 | 1982 | 1.9 | 1983 | 1.9 | 1984 | 1.9 | 1985 | 1.9 | 1986 | 1.9 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 | 1991 | 1.4 |
| 1981 | 1.9 | 1982 | 1.9 | 1983 | 1.9 | 1984 | 1.9 | 1985 | 1.9 | 1986 | 1.9 | 1987 | 1.3 | 1988 | 1.3 | 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 |
| 1982 | 1.9 | 1983 | 1.9 | 1984 | 1.9 | 1985 | 1.9 | 1986 | 1.9 | 1987 | 1.3 | 1988 | 1.3 | 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 | 1993 | 1.3 |
| 1983 | 1.8 | 1984 | 1.8 | 1985 | 1.8 | 1986 | 1.8 | 1987 | 1.3 | 1988 | 1.3 | 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 | 1993 | 1.3 | 1994 | 1.3 |
| 1984 | 1.8 | 1985 | 1.8 | 1986 | 1.8 | 1987 | 1.3 | 1988 | 1.3 | 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 | 1993 | 1.3 | 1994 | 1.3 | 1995 | 1.3 |
| 1985 | 1.8 | 1986 | 1.8 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 | 1991 | 1.2 | 1992 | 1.2 | 1993 | 1.2 | 1994 | 1.2 | 1995 | 1.2 | 1996 | 1.2 |
| 1986 | 1.7 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 | 1991 | 1.2 | 1992 | 1.2 | 1993 | 1.2 | 1994 | 1.2 | 1995 | 1.2 | 1996 | 1.2 | 1997 | 1.2 |
| 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 | 1991 | 1.2 | 1992 | 1.2 | 1993 | 1.2 | 1994 | 1.2 | 1995 | 1.2 | 1996 | 1.2 | 1997 | 1.2 | 1998 | 1.2 |
| 1988 | 1.1 | 1989 | 1.1 | 1990 | 1.1 | 1991 | 1.1 | 1992 | 1.1 | 1993 | 1.1 | 1994 | 1.1 | 1995 | 1.1 | 1996 | 1.1 | 1997 | 1.1 | 1998 | 1.1 | 1999 | 1.1 |
| 1989 | 1.1 | 1990 | 1.1 | 1991 | 1.1 | 1992 | 1.1 | 1993 | 1.1 | 1994 | 1.1 | 1995 | 1.1 | 1996 | 1.1 | 1997 | 1.1 | 1998 | 1.1 | 1999 | 1.1 | 2000 | 1.1 |
| 1990 | 1.0 | 1991 | 1.0 | 1992 | 1.0 | 1993 | 1.0 | 1994 | 1.0 | 1995 | 1.0 | 1996 | 1.0 | 1997 | 1.0 | 1998 | 1.0 | 1999 | 1.0 | 2000 | 1.0 | 2001 | 1.0 |
| 1991 | 1.0 | 1992 | 1.0 | 1993 | 1.0 | 1994 | 1.0 | 1995 | 1.0 | 1996 | 1.0 | 1997 | 1.0 | 1998 | 1.0 | 1999 | 1.0 | 2000 | 1.0 | 2001 | 1.0 | 2002 | 1.0 |
| 1992 | 0.9 | 1993 | 0.9 | 1994 | 0.9 | 1995 | 0.9 | 1996 | 0.9 | 1997 | 0.9 | 1998 | 0.9 | 1999 | 0.9 | 2000 | 0.9 | 2001 | 0.9 | 2002 | 0.9 | 2003 | 0.9 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.6.4.

## TABLE 1.6.3

## IDLE EMISSION RATES FOR LOW ALTITUDE LIGHT DUTY DIESEL POWERED TRUCKS

* IER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Min.) | Deterioration Rate (Gm/Min/10K Mi) |
|---|---|---|---|
| HC | Pre-1978 | 0.08 | 0.01 |
| | 1978-1980 | 0.10 | 0.01 |
| | 1981+ | 0.07 | 0.01 |
| CO | Pre-1978 | 0.30 | 0.02 |
| | 1978-1980 | 0.31 | 0.01 |
| | 1981+ | 0.31 | 0.01 |
| NOx | Pre-1978 | 0.19 | 0.01 |
| | 1978-1980 | 0.32 | 0.01 |
| | 1981-1986 | 0.34 | 0.01 |
| | 1987+ | 0.13 | 0.01 |

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

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## TABLE 1.6.4

## REGISTRATION MIX AND
## MILEAGE ACCUMULATION RATES FOR
## LOW ALTITUDE
## LIGHT DUTY DIESEL POWERED TRUCKS

| Model Year Index** | July 1 Registration Mix* | Mileage Accumulation Rate per truck * | Jan 1 Registration Mix | Jan 1 Mileage Accumulation Rate (fleet) | Jan 1 Mileage Accumulation (fleet) |
|---|---|---|---|---|---|
| 1 | 0.067 | 17552. | 0.022 | 17552. | 2194. |
| 2 | 0.085 | 16262. | 0.085 | 17229. | 13124. |
| 3 | 0.081 | 15068. | 0.081 | 15963. | 29711. |
| 4 | 0.077 | 13961. | 0.077 | 14791. | 45080. |
| 5 | 0.073 | 12936. | 0.073 | 13705. | 59321. |
| 6 | 0.069 | 11986. | 0.069 | 12698. | 72515. |
| 7 | 0.065 | 11105. | 0.065 | 11766. | 84741. |
| 8 | 0.061 | 10290. | 0.061 | 10901. | 96068. |
| 9 | 0.057 | 9534. | 0.057 | 10101. | 106564. |
| 10 | 0.053 | 8833. | 0.053 | 9359. | 116288. |
| 11 | 0.048 | 8185. | 0.048 | 8671. | 125298. |
| 12 | 0.044 | 7583. | 0.044 | 8034. | 133646. |
| 13 | 0.040 | 7026. | 0.040 | 7444. | 141381. |
| 14 | 0.036 | 6510. | 0.036 | 6897. | 148548. |
| 15 | 0.032 | 6032. | 0.032 | 6390. | 155188. |
| 16 | 0.028 | 5589. | 0.028 | 5921. | 161340. |
| 17 | 0.024 | 5179. | 0.024 | 5486. | 167041. |
| 18 | 0.020 | 4798. | 0.020 | 5084. | 172323. |
| 19 | 0.016 | 4446. | 0.016 | 4710. | 177217. |
| 20+ | 0.024 | 4119. | 0.024 | 4364. | 181752. |

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

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## TABLE 1.6.5

## EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR LOW ALTITUDE LIGHT DUTY DIESEL POWERED TRUCKS JANUARY 1, 1988

| Model Years | (A) LDT1 Fleet Registration | (B) Sales Fraction | (A*B) | (C=A*B/DAF) LDDT Registration | (D) Annual Mileage Accrual Rate | (C*D) | (C*D/TFNORM) Travel Fractions |
|---|---|---|---|---|---|---|---|
| 1988 | 0.022 | 0.240 | 0.005 | 0.067 | 17552. | 1181.5 | 0.080 |
| 1987 | 0.085 | 0.210 | 0.018 | 0.224 | 17229. | 3862.4 | 0.262 |
| 1986 | 0.081 | 0.180 | 0.015 | 0.183 | 15963. | 2923.0 | 0.198 |
| 1985 | 0.077 | 0.160 | 0.012 | 0.155 | 14791. | 2288.6 | 0.155 |
| 1984 | 0.073 | 0.130 | 0.009 | 0.119 | 13705. | 1633.4 | 0.111 |
| 1983 | 0.069 | 0.100 | 0.007 | 0.087 | 12698. | 1100.4 | 0.075 |
| 1982 | 0.065 | 0.080 | 0.005 | 0.065 | 11766. | 768.4 | 0.052 |
| 1981 | 0.061 | 0.060 | 0.004 | 0.046 | 10901. | 501.1 | 0.034 |
| 1980 | 0.057 | 0.034 | 0.002 | 0.024 | 10101. | 245.8 | 0.017 |
| 1979 | 0.053 | 0.028 | 0.001 | 0.019 | 9359. | 174.4 | 0.012 |
| 1978 | 0.048 | 0.009 | 0.000 | 0.005 | 8671. | 47.0 | 0.003 |
| 1977 | 0.044 | 0.005 | 0.000 | 0.003 | 8034. | 22.2 | 0.002 |
| 1976 | 0.040 | 0.003 | 0.000 | 0.002 | 7444. | 11.2 | 0.001 |
| 1975 | 0.036 | 0.002 | 0.000 | 0.001 | 6897. | 6.2 | 0.000 |
| 1974 | 0.032 | 0.0 | 0.0 | 0.0 | 6390. | 0.0 | 0.0 |
| 1973 | 0.028 | 0.0 | 0.0 | 0.0 | 5921. | 0.0 | 0.0 |
| 1972 | 0.024 | 0.0 | 0.0 | 0.0 | 5486. | 0.0 | 0.0 |
| 1971 | 0.020 | 0.0 | 0.0 | 0.0 | 5084. | 0.0 | 0.0 |
| 1970 | 0.016 | 0.0 | 0.0 | 0.0 | 4710. | 0.0 | 0.0 |
| 1969- | 0.024 | 0.0 | 0.0 | 0.0 | 4364. | 0.0 | 0.0 |
|  |  | DAF: | 0.080 |  | TFNORM: | 14765.6 |  |

WHERE :

A = January 1 registration mix from Table 1.6.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 1.6.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI) = .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

NOTE : In general, the travel weighting fractions will change for every calendar year since the sales fraction (column B) changes for almost every model year.

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## TABLE 1.6.6

## SPEED CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE LIGHT DUTY DIESEL POWERED TRUCKS

* $SCF(s,sadj) = SF(s)/SF(sadj)$

$SF(s) = EXP(A + B*s + C*s^2)$

| Pol | Model Years | Coefficients A | B | C |
|---|---|---|---|---|
| HC | All | 0.90900 | -0.05500 | 0.00044 |
| CO | All | 1.37520 | -0.08800 | 0.00091 |
| NOx | All | 0.66800 | -0.04800 | 0.00071 |

* WHERE :

s = average speed (mph)

sadj = basic test procedure speed; adjusted for fraction of cold start operation x and fraction of hot start operation w,
[ $1/sadj = (w+x)/26 + (1-w-x)/16$ ]

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# TABLE 1.6.7

## NORMALIZED BAG FRACTIONS FOR
## LOW ALTITUDE
## LIGHT DUTY DIESEL POWERED TRUCKS

| | | Normalized Fractions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Model | Test Seg.#1 | | Test Seg.#2 | | Test Seg.#3 | | Total Test | |
| Pol | Years | B1 | D1 | B2 | D2 | B3 | D3 | B0 | D0 |
| HC | Pre-1979 | 1.209 | 0.112 | 1.073 | 0.091 | 0.703 | 0.093 | 1.000 | 0.096 |
| | 1979 | 1.209 | 0.110 | 1.073 | 0.089 | 0.703 | 0.092 | 1.000 | 0.094 |
| | 1980-1982 | 1.209 | 0.110 | 1.073 | 0.089 | 0.703 | 0.092 | 1.000 | 0.094 |
| | 1983+ | 1.209 | 0.115 | 1.073 | 0.093 | 0.703 | 0.095 | 1.000 | 0.098 |
| CO | Pre-1979 | 1.199 | 0.062 | 0.935 | 0.044 | 0.974 | 0.053 | 1.000 | 0.050 |
| | 1979 | 1.199 | 0.060 | 0.935 | 0.043 | 0.974 | 0.051 | 1.000 | 0.049 |
| | 1980-1982 | 1.199 | 0.057 | 0.935 | 0.040 | 0.974 | 0.048 | 1.000 | 0.046 |
| | 1983+ | 1.199 | 0.057 | 0.935 | 0.040 | 0.974 | 0.048 | 1.000 | 0.046 |
| NOx | Pre-1979 | 1.068 | 0.033 | 0.981 | 0.036 | 0.985 | 0.032 | 1.000 | 0.034 |
| | 1979 | 1.068 | 0.033 | 0.981 | 0.035 | 0.985 | 0.032 | 1.000 | 0.034 |
| | 1980-1984 | 1.068 | 0.036 | 0.981 | 0.038 | 0.985 | 0.035 | 1.000 | 0.037 |
| | 1985+ | 1.068 | 0.071 | 0.981 | 0.072 | 0.985 | 0.068 | 1.000 | 0.071 |

NOTE : The fractions given in this table are used in the calculation of the operating-mode/ temperature correction factor (OMTCF).

WHERE :
OMTCF = ((TERM1 + TERM2 + TERM3)/DENOM)
TERM1 = W *TCF(1)*(B1+D1*M)
TERM2 = (1-W-X)*TCF(2)*(B2+D2*M)
TERM3 = X *TCF(3)*(B3+D3*M)
DENOM = B0 + D0*M
W = Fraction of VMT in the cold start mode
X = Fraction of VMT in the hot start mode
TCF(b) = Temperature correction factor for pollutant, model year; for test segment b
M = Cumulative mileage / 10,000

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## TABLE 1.7.1

## EXHAUST EMISSION RATES FOR LOW ALTITUDE HEAVY DUTY DIESEL POWERED VEHICLES (RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Mile) | Deterioration Rate (Gm/Mi/10K Mi) | 50,000 Mile Emission Level (Grams/Mile) |
|---|---|---|---|---|
| HC | Pre-1963 | 3.37 | 0.05 | 3.62 |
| | 1963-1965 | 3.36 | 0.05 | 3.61 |
| | 1966-1968 | 3.48 | 0.06 | 3.78 |
| | 1969-1971 | 3.70 | 0.06 | 4.00 |
| | 1972-1974 | 3.93 | 0.06 | 4.23 |
| | 1975-1979 | 3.89 | 0.06 | 4.19 |
| | 1980-1981 | 3.53 | 0.06 | 3.83 |
| | 1982-1984 | 3.25 | 0.05 | 3.50 |
| | 1985 | 3.11 | 0.02 | 3.21 |
| | 1986 | 2.50 | 0.02 | 2.60 |
| | 1987-1992 | 2.43 | 0.02 | 2.53 |
| | 1993-1996 | 2.39 | 0.02 | 2.49 |
| | 1997+ | 2.37 | 0.02 | 2.47 |
| CO | Pre-1963 | 9.84 | 0.14 | 10.54 |
| | 1963-1965 | 9.80 | 0.14 | 10.50 |
| | 1966-1968 | 10.15 | 0.14 | 10.85 |
| | 1969-1971 | 10.80 | 0.15 | 11.55 |
| | 1972-1974 | 11.46 | 0.16 | 12.26 |
| | 1975-1979 | 11.18 | 0.16 | 11.98 |
| | 1980-1981 | 9.50 | 0.14 | 10.20 |
| | 1982-1984 | 8.75 | 0.13 | 9.40 |
| | 1985 | 8.45 | 0.12 | 9.05 |
| | 1986 | 8.30 | 0.12 | 8.90 |
| | 1987-1992 | 8.07 | 0.12 | 8.67 |
| | 1993-1996 | 7.93 | 0.12 | 8.53 |
| | 1997+ | 7.86 | 0.11 | 8.41 |
| NOx | Pre-1963 | 21.94 | 0.0 | 21.94 |
| | 1963-1965 | 21.85 | 0.0 | 21.85 |
| | 1966-1968 | 22.61 | 0.0 | 22.61 |
| | 1969-1971 | 24.06 | 0.0 | 24.06 |
| | 1972-1974 | 25.53 | 0.0 | 25.53 |
| | 1975-1979 | 24.77 | 0.0 | 24.77 |
| | 1980-1981 | 20.50 | 0.0 | 20.50 |
| | 1982-1984 | 18.88 | 0.0 | 18.88 |
| | 1985 | 18.23 | 0.0 | 18.23 |
| | 1986 | 17.90 | 0.0 | 17.90 |
| | 1987-1992 | 11.19 | 0.05 | 11.44 |
| | 1993-1996 | 10.98 | 0.05 | 11.23 |
| | 1997+ | 10.89 | 0.05 | 11.14 |

* WHERE :
BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

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# EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
# HEAVY DUTY DIESEL POWERED VEHICLES
# TOTAL HC

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 6.4 | 1962 | 6.4 | 1963 | 6.4 | 1964 | 6.4 | 1965 | 6.4 | 1966 | 7.1 | 1967 | 7.1 | 1968 | 7.1 | 1969 | 7.3 | 1970 | 7.3 | 1971 | 7.3 | 1972 | 7.6 |
| 1962 | 6.3 | 1963 | 6.3 | 1964 | 6.3 | 1965 | 6.3 | 1966 | 7.0 | 1967 | 7.0 | 1968 | 7.0 | 1969 | 7.3 | 1970 | 7.3 | 1971 | 7.3 | 1972 | 7.5 | 1973 | 7.5 |
| 1963 | 6.3 | 1964 | 6.3 | 1965 | 6.3 | 1966 | 7.0 | 1967 | 7.0 | 1968 | 7.0 | 1969 | 7.2 | 1970 | 7.2 | 1971 | 7.2 | 1972 | 7.4 | 1973 | 7.4 | 1974 | 7.4 |
| 1964 | 6.2 | 1965 | 6.2 | 1966 | 6.9 | 1967 | 6.9 | 1968 | 6.9 | 1969 | 7.1 | 1970 | 7.1 | 1971 | 7.1 | 1972 | 7.3 | 1973 | 7.3 | 1974 | 7.3 | 1975 | 7.3 |
| 1965 | 6.1 | 1966 | 6.8 | 1967 | 6.8 | 1968 | 6.8 | 1969 | 7.0 | 1970 | 7.0 | 1971 | 7.0 | 1972 | 7.2 | 1973 | 7.2 | 1974 | 7.2 | 1975 | 7.2 | 1976 | 7.2 |
| 1966 | 6.7 | 1967 | 6.7 | 1968 | 6.7 | 1969 | 6.9 | 1970 | 6.9 | 1971 | 6.9 | 1972 | 7.1 | 1973 | 7.1 | 1974 | 7.1 | 1975 | 7.1 | 1976 | 7.1 | 1977 | 7.1 |
| 1967 | 6.5 | 1968 | 6.5 | 1969 | 6.8 | 1970 | 6.8 | 1971 | 6.8 | 1972 | 7.0 | 1973 | 7.0 | 1974 | 7.0 | 1975 | 6.9 | 1976 | 6.9 | 1977 | 6.9 | 1978 | 6.9 |
| 1968 | 6.4 | 1969 | 6.6 | 1970 | 6.6 | 1971 | 6.6 | 1972 | 6.9 | 1973 | 6.9 | 1974 | 6.9 | 1975 | 6.8 | 1976 | 6.8 | 1977 | 6.8 | 1978 | 6.8 | 1979 | 6.8 |
| 1969 | 6.5 | 1970 | 6.5 | 1971 | 6.5 | 1972 | 6.7 | 1973 | 6.7 | 1974 | 6.7 | 1975 | 6.7 | 1976 | 6.7 | 1977 | 6.7 | 1978 | 6.7 | 1979 | 6.7 | 1980 | 6.3 |
| 1970 | 6.3 | 1971 | 6.3 | 1972 | 6.5 | 1973 | 6.5 | 1974 | 6.5 | 1975 | 6.5 | 1976 | 6.5 | 1977 | 6.5 | 1978 | 6.5 | 1979 | 6.5 | 1980 | 6.1 | 1981 | 6.1 |
| 1971 | 6.1 | 1972 | 6.4 | 1973 | 6.4 | 1974 | 6.4 | 1975 | 6.3 | 1976 | 6.3 | 1977 | 6.3 | 1978 | 6.3 | 1979 | 6.3 | 1980 | 6.0 | 1981 | 6.0 | 1982 | 5.3 |
| 1972 | 6.2 | 1973 | 6.2 | 1974 | 6.2 | 1975 | 6.1 | 1976 | 6.1 | 1977 | 6.1 | 1978 | 6.1 | 1979 | 6.1 | 1980 | 5.8 | 1981 | 5.8 | 1982 | 5.1 | 1983 | 5.1 |
| 1973 | 6.0 | 1974 | 6.0 | 1975 | 5.9 | 1976 | 5.9 | 1977 | 5.9 | 1978 | 5.9 | 1979 | 5.9 | 1980 | 5.6 | 1981 | 5.6 | 1982 | 4.9 | 1983 | 4.9 | 1984 | 4.9 |
| 1974 | 5.7 | 1975 | 5.7 | 1976 | 5.7 | 1977 | 5.7 | 1978 | 5.7 | 1979 | 5.7 | 1980 | 5.3 | 1981 | 5.3 | 1982 | 4.7 | 1983 | 4.7 | 1984 | 4.7 | 1985 | 3.7 |
| 1975 | 5.4 | 1976 | 5.4 | 1977 | 5.4 | 1978 | 5.4 | 1979 | 5.4 | 1980 | 5.1 | 1981 | 5.1 | 1982 | 4.5 | 1983 | 4.5 | 1984 | 4.5 | 1985 | 3.6 | 1986 | 3.0 |
| 1976 | 5.1 | 1977 | 5.1 | 1978 | 5.1 | 1979 | 5.1 | 1980 | 4.8 | 1981 | 4.8 | 1982 | 4.3 | 1983 | 4.3 | 1984 | 4.3 | 1985 | 3.5 | 1986 | 2.9 | 1987 | 2.8 |
| 1977 | 4.8 | 1978 | 4.8 | 1979 | 4.8 | 1980 | 4.5 | 1981 | 4.5 | 1982 | 4.0 | 1983 | 4.0 | 1984 | 4.0 | 1985 | 3.4 | 1986 | 2.8 | 1987 | 2.7 | 1988 | 2.7 |
| 1978 | 4.5 | 1979 | 4.5 | 1980 | 4.1 | 1981 | 4.1 | 1982 | 3.7 | 1983 | 3.7 | 1984 | 3.7 | 1985 | 3.3 | 1986 | 2.7 | 1987 | 2.6 | 1988 | 2.6 | 1989 | 2.6 |
| 1979 | 4.1 | 1980 | 3.7 | 1981 | 3.7 | 1982 | 3.4 | 1983 | 3.4 | 1984 | 3.4 | 1985 | 3.2 | 1986 | 2.6 | 1987 | 2.5 | 1988 | 2.5 | 1989 | 2.5 | 1990 | 2.5 |
| 1980 | 3.5 | 1981 | 3.5 | 1982 | 3.3 | 1983 | 3.3 | 1984 | 3.3 | 1985 | 3.1 | 1986 | 2.5 | 1987 | 2.4 | 1988 | 2.4 | 1989 | 2.4 | 1990 | 2.4 | 1991 | 2.4 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 7.6 | 1974 | 7.6 | 1975 | 7.5 | 1976 | 7.5 | 1977 | 7.5 | 1978 | 7.5 | 1979 | 7.5 | 1980 | 7.2 | 1981 | 7.2 | 1982 | 6.3 | 1983 | 6.3 | 1984 | 6.3 |
| 1974 | 7.5 | 1975 | 7.5 | 1976 | 7.5 | 1977 | 7.5 | 1978 | 7.5 | 1979 | 7.5 | 1980 | 7.1 | 1981 | 7.1 | 1982 | 6.2 | 1983 | 6.2 | 1984 | 6.2 | 1985 | 4.3 |
| 1975 | 7.4 | 1976 | 7.4 | 1977 | 7.4 | 1978 | 7.4 | 1979 | 7.4 | 1980 | 7.0 | 1981 | 7.0 | 1982 | 6.2 | 1983 | 6.2 | 1984 | 6.2 | 1985 | 4.3 | 1986 | 3.7 |
| 1976 | 7.3 | 1977 | 7.3 | 1978 | 7.3 | 1979 | 7.3 | 1980 | 6.9 | 1981 | 6.9 | 1982 | 6.1 | 1983 | 6.1 | 1984 | 6.1 | 1985 | 4.2 | 1986 | 3.6 | 1987 | 3.6 |
| 1977 | 7.2 | 1978 | 7.2 | 1979 | 7.2 | 1980 | 6.8 | 1981 | 6.8 | 1982 | 6.0 | 1983 | 6.0 | 1984 | 6.0 | 1985 | 4.2 | 1986 | 3.6 | 1987 | 3.5 | 1988 | 3.5 |
| 1978 | 7.1 | 1979 | 7.1 | 1980 | 6.7 | 1981 | 6.7 | 1982 | 5.9 | 1983 | 5.9 | 1984 | 5.9 | 1985 | 4.2 | 1986 | 3.6 | 1987 | 3.5 | 1988 | 3.5 | 1989 | 3.5 |
| 1979 | 6.9 | 1980 | 6.6 | 1981 | 6.6 | 1982 | 5.8 | 1983 | 5.8 | 1984 | 5.8 | 1985 | 4.1 | 1986 | 3.5 | 1987 | 3.4 | 1988 | 3.4 | 1989 | 3.4 | 1990 | 3.4 |
| 1980 | 6.5 | 1981 | 6.5 | 1982 | 5.7 | 1983 | 5.7 | 1984 | 5.7 | 1985 | 4.1 | 1986 | 3.5 | 1987 | 3.4 | 1988 | 3.4 | 1989 | 3.4 | 1990 | 3.4 | 1991 | 3.4 |
| 1981 | 6.3 | 1982 | 5.6 | 1983 | 5.6 | 1984 | 5.6 | 1985 | 4.0 | 1986 | 3.4 | 1987 | 3.4 | 1988 | 3.4 | 1989 | 3.4 | 1990 | 3.4 | 1991 | 3.4 | 1992 | 3.4 |
| 1982 | 5.4 | 1983 | 5.4 | 1984 | 5.4 | 1985 | 4.0 | 1986 | 3.4 | 1987 | 3.3 | 1988 | 3.3 | 1989 | 3.3 | 1990 | 3.3 | 1991 | 3.3 | 1992 | 3.3 | 1993 | 3.3 |
| 1983 | 5.3 | 1984 | 5.3 | 1985 | 3.9 | 1986 | 3.3 | 1987 | 3.2 | 1988 | 3.2 | 1989 | 3.2 | 1990 | 3.2 | 1991 | 3.2 | 1992 | 3.2 | 1993 | 3.2 | 1994 | 3.2 |
| 1984 | 5.1 | 1985 | 3.9 | 1986 | 3.2 | 1987 | 3.2 | 1988 | 3.2 | 1989 | 3.2 | 1990 | 3.2 | 1991 | 3.2 | 1992 | 3.2 | 1993 | 3.1 | 1994 | 3.1 | 1995 | 3.1 |
| 1985 | 3.8 | 1986 | 3.2 | 1987 | 3.1 | 1988 | 3.1 | 1989 | 3.1 | 1990 | 3.1 | 1991 | 3.1 | 1992 | 3.1 | 1993 | 3.1 | 1994 | 3.1 | 1995 | 3.1 | 1996 | 3.1 |
| 1986 | 3.1 | 1987 | 3.0 | 1988 | 3.0 | 1989 | 3.0 | 1990 | 3.0 | 1991 | 3.0 | 1992 | 3.0 | 1993 | 3.0 | 1994 | 3.0 | 1995 | 3.0 | 1996 | 3.0 | 1997 | 3.0 |
| 1987 | 2.9 | 1988 | 2.9 | 1989 | 2.9 | 1990 | 2.9 | 1991 | 2.9 | 1992 | 2.9 | 1993 | 2.9 | 1994 | 2.9 | 1995 | 2.9 | 1996 | 2.9 | 1997 | 2.9 | 1998 | 2.9 |
| 1988 | 2.8 | 1989 | 2.8 | 1990 | 2.8 | 1991 | 2.8 | 1992 | 2.8 | 1993 | 2.8 | 1994 | 2.8 | 1995 | 2.8 | 1996 | 2.8 | 1997 | 2.8 | 1998 | 2.8 | 1999 | 2.8 |
| 1989 | 2.7 | 1990 | 2.7 | 1991 | 2.7 | 1992 | 2.7 | 1993 | 2.7 | 1994 | 2.7 | 1995 | 2.7 | 1996 | 2.7 | 1997 | 2.7 | 1998 | 2.7 | 1999 | 2.7 | 2000 | 2.7 |
| 1990 | 2.6 | 1991 | 2.6 | 1992 | 2.6 | 1993 | 2.6 | 1994 | 2.6 | 1995 | 2.6 | 1996 | 2.6 | 1997 | 2.6 | 1998 | 2.6 | 1999 | 2.6 | 2000 | 2.6 | 2001 | 2.6 |
| 1991 | 2.5 | 1992 | 2.5 | 1993 | 2.5 | 1994 | 2.5 | 1995 | 2.5 | 1996 | 2.5 | 1997 | 2.4 | 1998 | 2.4 | 1999 | 2.4 | 2000 | 2.4 | 2001 | 2.4 | 2002 | 2.4 |
| 1992 | 2.4 | 1993 | 2.4 | 1994 | 2.4 | 1995 | 2.4 | 1996 | 2.4 | 1997 | 2.4 | 1998 | 2.4 | 1999 | 2.4 | 2000 | 2.4 | 2001 | 2.4 | 2002 | 2.4 | 2003 | 2.4 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F. Emissions are based on the January 1 mileage accumulation figures given in Table 1.7.4.

TABLE 1.7.2B

DATE : MAY 25, 1985

### EXHAUST EMISSION LEVELS FOR LOW ALTITUDE HEAVY DUTY DIESEL POWERED VEHICLES CO

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 18.3 | 1962 | 18.3 | 1963 | 18.3 | 1964 | 18.3 | 1965 | 18.3 | 1966 | 18.7 | 1967 | 18.7 | 1968 | 18.7 | 1969 | 19.9 | 1970 | 19.9 | 1971 | 19.9 | 1972 | 21.2 |
| 1962 | 18.2 | 1963 | 18.1 | 1964 | 18.1 | 1965 | 18.1 | 1966 | 18.5 | 1967 | 18.5 | 1968 | 18.5 | 1969 | 19.7 | 1970 | 19.7 | 1971 | 19.7 | 1972 | 21.0 | 1973 | 21.0 |
| 1963 | 17.9 | 1964 | 17.9 | 1965 | 17.9 | 1966 | 18.3 | 1967 | 18.3 | 1968 | 18.3 | 1969 | 19.5 | 1970 | 19.5 | 1971 | 19.5 | 1972 | 20.7 | 1973 | 20.7 | 1974 | 20.7 |
| 1964 | 17.7 | 1965 | 17.7 | 1966 | 18.1 | 1967 | 18.1 | 1968 | 18.1 | 1969 | 19.3 | 1970 | 19.3 | 1971 | 19.3 | 1972 | 20.5 | 1973 | 20.5 | 1974 | 20.5 | 1975 | 20.2 |
| 1965 | 17.5 | 1966 | 17.8 | 1967 | 17.8 | 1968 | 17.8 | 1969 | 19.0 | 1970 | 19.0 | 1971 | 19.0 | 1972 | 20.2 | 1973 | 20.2 | 1974 | 20.2 | 1975 | 19.9 | 1976 | 19.9 |
| 1966 | 17.6 | 1967 | 17.6 | 1968 | 17.6 | 1969 | 18.7 | 1970 | 18.7 | 1971 | 18.7 | 1972 | 19.9 | 1973 | 19.9 | 1974 | 19.9 | 1975 | 19.7 | 1976 | 19.7 | 1977 | 19.7 |
| 1967 | 17.3 | 1968 | 17.3 | 1969 | 18.4 | 1970 | 18.4 | 1971 | 18.4 | 1972 | 19.6 | 1973 | 19.6 | 1974 | 19.6 | 1975 | 19.3 | 1976 | 19.3 | 1977 | 19.3 | 1978 | 19.3 |
| 1968 | 17.0 | 1969 | 18.1 | 1970 | 18.1 | 1971 | 18.1 | 1972 | 19.2 | 1973 | 19.2 | 1974 | 19.2 | 1975 | 19.0 | 1976 | 19.0 | 1977 | 19.0 | 1978 | 19.0 | 1979 | 19.0 |
| 1969 | 17.7 | 1970 | 17.7 | 1971 | 17.7 | 1972 | 18.9 | 1973 | 18.9 | 1974 | 18.9 | 1975 | 18.6 | 1976 | 18.6 | 1977 | 18.6 | 1978 | 18.6 | 1979 | 18.6 | 1980 | 16.0 |
| 1970 | 17.3 | 1971 | 17.3 | 1972 | 18.4 | 1973 | 18.4 | 1974 | 18.4 | 1975 | 18.1 | 1976 | 18.1 | 1977 | 18.1 | 1978 | 18.1 | 1979 | 18.1 | 1980 | 15.6 | 1981 | 15.6 |
| 1971 | 16.9 | 1972 | 17.9 | 1973 | 17.9 | 1974 | 17.9 | 1975 | 17.7 | 1976 | 17.7 | 1977 | 17.7 | 1978 | 17.7 | 1979 | 17.7 | 1980 | 15.2 | 1981 | 15.2 | 1982 | 14.0 |
| 1972 | 17.4 | 1973 | 17.4 | 1974 | 17.4 | 1975 | 17.1 | 1976 | 17.1 | 1977 | 17.1 | 1978 | 17.1 | 1979 | 17.1 | 1980 | 14.7 | 1981 | 14.7 | 1982 | 13.6 | 1983 | 13.6 |
| 1973 | 16.8 | 1974 | 16.8 | 1975 | 16.6 | 1976 | 16.6 | 1977 | 16.6 | 1978 | 16.6 | 1979 | 16.6 | 1980 | 14.2 | 1981 | 14.2 | 1982 | 13.1 | 1983 | 13.1 | 1984 | 13.1 |
| 1974 | 16.2 | 1975 | 15.9 | 1976 | 15.9 | 1977 | 15.9 | 1978 | 15.9 | 1979 | 15.9 | 1980 | 13.7 | 1981 | 13.7 | 1982 | 12.6 | 1983 | 12.6 | 1984 | 12.6 | 1985 | 12.0 |
| 1975 | 15.2 | 1976 | 15.2 | 1977 | 15.2 | 1978 | 15.2 | 1979 | 15.2 | 1980 | 13.1 | 1981 | 13.1 | 1982 | 12.1 | 1983 | 12.1 | 1984 | 12.1 | 1985 | 11.5 | 1986 | 11.3 |
| 1976 | 14.5 | 1977 | 14.5 | 1978 | 14.5 | 1979 | 14.5 | 1980 | 12.4 | 1981 | 12.4 | 1982 | 11.4 | 1983 | 11.4 | 1984 | 11.4 | 1985 | 10.9 | 1986 | 10.8 | 1987 | 10.5 |
| 1977 | 13.6 | 1978 | 13.6 | 1979 | 13.6 | 1980 | 11.7 | 1981 | 11.7 | 1982 | 10.8 | 1983 | 10.8 | 1984 | 10.8 | 1985 | 10.3 | 1986 | 10.1 | 1987 | 9.9 | 1988 | 9.9 |
| 1978 | 12.7 | 1979 | 12.7 | 1980 | 10.9 | 1981 | 10.9 | 1982 | 10.0 | 1983 | 10.0 | 1984 | 10.0 | 1985 | 9.6 | 1986 | 9.5 | 1987 | 9.2 | 1988 | 9.2 | 1989 | 9.2 |
| 1979 | 11.7 | 1980 | 10.0 | 1981 | 10.0 | 1982 | 9.2 | 1983 | 9.2 | 1984 | 9.2 | 1985 | 8.8 | 1986 | 8.7 | 1987 | 8.5 | 1988 | 8.5 | 1989 | 8.5 | 1990 | 8.5 |
| 1980 | 9.5 | 1981 | 9.5 | 1982 | 8.8 | 1983 | 8.8 | 1984 | 8.8 | 1985 | 8.4 | 1986 | 8.3 | 1987 | 8.1 | 1988 | 8.1 | 1989 | 8.1 | 1990 | 8.1 | 1991 | 8.1 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 21.2 | 1974 | 21.2 | 1975 | 20.9 | 1976 | 20.9 | 1977 | 20.9 | 1978 | 20.9 | 1979 | 20.9 | 1980 | 18.0 | 1981 | 18.0 | 1982 | 16.6 | 1983 | 16.6 | 1984 | 16.6 |
| 1974 | 21.0 | 1975 | 20.7 | 1976 | 20.7 | 1977 | 20.7 | 1978 | 20.7 | 1979 | 20.7 | 1980 | 17.8 | 1981 | 17.8 | 1982 | 16.5 | 1983 | 16.5 | 1984 | 16.5 | 1985 | 15.6 |
| 1975 | 20.5 | 1976 | 20.5 | 1977 | 20.5 | 1978 | 20.5 | 1979 | 20.5 | 1980 | 17.6 | 1981 | 17.6 | 1982 | 16.3 | 1983 | 16.3 | 1984 | 16.3 | 1985 | 15.4 | 1986 | 15.3 |
| 1976 | 20.2 | 1977 | 20.2 | 1978 | 20.2 | 1979 | 20.2 | 1980 | 17.4 | 1981 | 17.4 | 1982 | 16.1 | 1983 | 16.1 | 1984 | 16.1 | 1985 | 15.2 | 1986 | 15.1 | 1987 | 14.8 |
| 1977 | 19.9 | 1378 | 19.9 | 1979 | 19.9 | 1980 | 17.2 | 1981 | 17.2 | 1982 | 15.9 | 1983 | 15.9 | 1984 | 15.9 | 1985 | 15.0 | 1986 | 14.9 | 1987 | 14.6 | 1988 | 14.6 |
| 1978 | 19.7 | 1979 | 19.7 | 1980 | 16.9 | 1981 | 16.9 | 1982 | 15.6 | 1983 | 15.6 | 1984 | 15.6 | 1985 | 14.8 | 1986 | 14.7 | 1987 | 14.4 | 1988 | 14.4 | 1989 | 14.4 |
| 1979 | 19.3 | 1980 | 16.6 | 1981 | 16.6 | 1982 | 15.4 | 1983 | 15.4 | 1984 | 15.4 | 1985 | 14.6 | 1986 | 14.4 | 1987 | 14.2 | 1988 | 14.2 | 1989 | 14.2 | 1990 | 14.2 |
| 1980 | 16.3 | 1981 | 16.3 | 1982 | 15.1 | 1983 | 15.1 | 1984 | 15.1 | 1985 | 14.3 | 1986 | 14.1 | 1987 | 13.9 | 1988 | 13.9 | 1989 | 13.9 | 1990 | 13.9 | 1991 | 13.9 |
| 1981 | 16.0 | 1982 | 14.8 | 1983 | 14.8 | 1984 | 14.8 | 1985 | 14.0 | 1986 | 13.8 | 1987 | 13.6 | 1988 | 13.6 | 1989 | 13.6 | 1990 | 13.6 | 1991 | 13.6 | 1992 | 13.6 |
| 1982 | 14.4 | 1983 | 14.4 | 1984 | 14.4 | 1985 | 13.7 | 1986 | 13.5 | 1987 | 13.3 | 1988 | 13.3 | 1989 | 13.3 | 1990 | 13.3 | 1991 | 13.3 | 1992 | 13.3 | 1993 | 13.2 |
| 1983 | 14.0 | 1984 | 14.0 | 1985 | 13.3 | 1986 | 13.2 | 1987 | 12.9 | 1988 | 12.9 | 1989 | 12.9 | 1990 | 12.9 | 1991 | 12.9 | 1992 | 12.9 | 1993 | 12.8 | 1994 | 12.8 |
| 1984 | 13.6 | 1985 | 12.9 | 1986 | 12.8 | 1987 | 12.5 | 1988 | 12.5 | 1989 | 12.5 | 1990 | 12.5 | 1991 | 12.5 | 1992 | 12.5 | 1993 | 12.4 | 1994 | 12.4 | 1995 | 12.4 |
| 1985 | 12.5 | 1986 | 12.3 | 1987 | 12.1 | 1988 | 12.1 | 1989 | 12.1 | 1990 | 12.1 | 1991 | 12.1 | 1992 | 12.1 | 1993 | 12.0 | 1994 | 12.0 | 1995 | 12.0 | 1996 | 12.0 |
| 1986 | 11.9 | 1987 | 11.6 | 1988 | 11.6 | 1989 | 11.6 | 1990 | 11.6 | 1991 | 11.6 | 1992 | 11.6 | 1993 | 11.5 | 1994 | 11.5 | 1995 | 11.5 | 1996 | 11.5 | 1997 | 11.1 |
| 1987 | 11.1 | 1988 | 11.1 | 1989 | 11.1 | 1990 | 11.1 | 1991 | 11.1 | 1992 | 11.1 | 1993 | 11.0 | 1994 | 11.0 | 1995 | 11.0 | 1996 | 11.0 | 1997 | 10.7 | 1998 | 10.7 |
| 1988 | 10.5 | 1989 | 10.5 | 1990 | 10.5 | 1991 | 10.5 | 1992 | 10.5 | 1993 | 10.4 | 1994 | 10.4 | 1995 | 10.4 | 1996 | 10.4 | 1997 | 10.1 | 1998 | 10.1 | 1999 | 10.1 |
| 1989 | 9.9 | 1990 | 9.9 | 1991 | 9.9 | 1992 | 9.9 | 1993 | 9.8 | 1994 | 9.8 | 1995 | 9.8 | 1996 | 9.8 | 1997 | 9.6 | 1998 | 9.6 | 1999 | 9.6 | 2000 | 9.6 |
| 1990 | 9.2 | 1991 | 9.2 | 1992 | 9.2 | 1993 | 9.1 | 1994 | 9.1 | 1995 | 9.1 | 1996 | 9.1 | 1997 | 8.9 | 1998 | 8.9 | 1999 | 8.9 | 2000 | 8.9 | 2001 | 8.9 |
| 1991 | 8.5 | 1992 | 8.5 | 1993 | 8.3 | 1994 | 8.3 | 1995 | 8.3 | 1996 | 8.3 | 1997 | 8.2 | 1998 | 8.2 | 1999 | 8.2 | 2000 | 8.2 | 2001 | 8.2 | 2002 | 8.2 |
| 1992 | 8.1 | 1993 | 7.9 | 1994 | 7.9 | 1995 | 7.9 | 1996 | 7.9 | 1997 | 7.9 | 1998 | 7.9 | 1999 | 7.9 | 2000 | 7.9 | 2001 | 7.9 | 2002 | 7.9 | 2003 | 7.9 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F. Emissions are based on the January 1 mileage accumulation figures given in Table 1.7.4.

## TABLE 1.7.2C

DATE : MAY 25, 1985

### EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
### HEAVY DUTY DIESEL POWERED VEHICLES
### NOx

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 21.9 | 1962 | 21.9 | 1963 | 21.8 | 1964 | 21.8 | 1965 | 21.8 | 1966 | 22.6 | 1967 | 22.6 | 1968 | 22.6 | 1969 | 24.1 | 1970 | 24.1 | 1971 | 24.1 | 1972 | 25.5 |
| 1962 | 21.9 | 1963 | 21.8 | 1964 | 21.8 | 1965 | 21.8 | 1966 | 22.6 | 1967 | 22.6 | 1968 | 22.6 | 1969 | 24.1 | 1970 | 24.1 | 1971 | 24.1 | 1972 | 25.5 | 1973 | 25.5 |
| 1963 | 21.8 | 1964 | 21.8 | 1965 | 21.8 | 1966 | 22.6 | 1967 | 22.6 | 1968 | 22.6 | 1969 | 24.1 | 1970 | 24.1 | 1971 | 24.1 | 1972 | 25.5 | 1973 | 25.5 | 1974 | 25.5 |
| 1964 | 21.8 | 1965 | 21.8 | 1966 | 22.6 | 1967 | 22.6 | 1968 | 22.6 | 1969 | 24.1 | 1970 | 24.1 | 1971 | 24.1 | 1972 | 25.5 | 1973 | 25.5 | 1974 | 25.5 | 1975 | 24.8 |
| 1965 | 21.8 | 1966 | 22.6 | 1967 | 22.6 | 1968 | 22.6 | 1969 | 24.1 | 1970 | 24.1 | 1971 | 24.1 | 1972 | 25.5 | 1973 | 25.5 | 1974 | 25.5 | 1975 | 24.8 | 1976 | 24.8 |
| 1966 | 22.6 | 1967 | 22.6 | 1968 | 22.6 | 1969 | 24.1 | 1970 | 24.1 | 1971 | 24.1 | 1972 | 25.5 | 1973 | 25.5 | 1974 | 25.5 | 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 |
| 1967 | 22.6 | 1968 | 22.6 | 1969 | 24.1 | 1970 | 24.1 | 1971 | 24.1 | 1972 | 25.5 | 1973 | 25.5 | 1974 | 25.5 | 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 |
| 1968 | 22.6 | 1969 | 24.1 | 1970 | 24.1 | 1971 | 24.1 | 1972 | 25.5 | 1973 | 25.5 | 1974 | 25.5 | 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 |
| 1969 | 24.1 | 1970 | 24.1 | 1971 | 24.1 | 1972 | 25.5 | 1973 | 25.5 | 1974 | 25.5 | 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 |
| 1970 | 24.1 | 1971 | 24.1 | 1972 | 25.5 | 1973 | 25.5 | 1974 | 25.5 | 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 |
| 1971 | 24.1 | 1972 | 25.5 | 1973 | 25.5 | 1974 | 25.5 | 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 |
| 1972 | 25.5 | 1973 | 25.5 | 1974 | 25.5 | 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 |
| 1973 | 25.5 | 1974 | 25.5 | 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 |
| 1974 | 25.5 | 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 |
| 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 |
| 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 12.2 |
| 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 12.0 | 1988 | 12.0 |
| 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 11.7 | 1988 | 11.7 | 1989 | 11.7 |
| 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 11.4 | 1988 | 11.4 | 1989 | 11.4 | 1990 | 11.4 |
| 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 11.2 | 1988 | 11.2 | 1989 | 11.2 | 1990 | 11.2 | 1991 | 11.2 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 25.5 | 1974 | 25.5 | 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 |
| 1974 | 25.5 | 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 |
| 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 |
| 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 14.0 |
| 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 13.9 | 1988 | 13.9 |
| 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 13.8 | 1988 | 13.8 | 1989 | 13.8 |
| 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 13.7 | 1988 | 13.7 | 1989 | 13.7 | 1990 | 13.7 |
| 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 13.6 | 1988 | 13.6 | 1989 | 13.6 | 1990 | 13.6 | 1991 | 13.6 |
| 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 13.5 | 1988 | 13.5 | 1989 | 13.5 | 1990 | 13.5 | 1991 | 13.5 | 1992 | 13.5 |
| 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 13.4 | 1988 | 13.4 | 1989 | 13.4 | 1990 | 13.4 | 1991 | 13.4 | 1992 | 13.4 | 1993 | 13.2 |
| 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 13.2 | 1988 | 13.2 | 1989 | 13.2 | 1990 | 13.2 | 1991 | 13.2 | 1992 | 13.2 | 1993 | 13.0 | 1994 | 13.0 |
| 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 13.1 | 1988 | 13.1 | 1989 | 13.1 | 1990 | 13.1 | 1991 | 13.1 | 1992 | 13.1 | 1993 | 12.8 | 1994 | 12.8 | 1995 | 12.8 |
| 1985 | 18.2 | 1986 | 17.9 | 1987 | 12.9 | 1988 | 12.9 | 1989 | 12.9 | 1990 | 12.9 | 1991 | 12.9 | 1992 | 12.9 | 1993 | 12.7 | 1994 | 12.7 | 1995 | 12.7 | 1996 | 12.7 |
| 1986 | 17.9 | 1987 | 12.7 | 1988 | 12.7 | 1989 | 12.7 | 1990 | 12.7 | 1991 | 12.7 | 1992 | 12.7 | 1993 | 12.5 | 1994 | 12.5 | 1995 | 12.5 | 1996 | 12.5 | 1997 | 12.4 |
| 1987 | 12.5 | 1988 | 12.5 | 1989 | 12.5 | 1990 | 12.5 | 1991 | 12.5 | 1992 | 12.5 | 1993 | 12.3 | 1994 | 12.3 | 1995 | 12.3 | 1996 | 12.3 | 1997 | 12.2 | 1998 | 12.2 |
| 1988 | 12.2 | 1989 | 12.2 | 1990 | 12.2 | 1991 | 12.2 | 1992 | 12.2 | 1993 | 12.0 | 1994 | 12.0 | 1995 | 12.0 | 1996 | 12.0 | 1997 | 11.9 | 1998 | 11.9 | 1999 | 11.9 |
| 1989 | 12.0 | 1990 | 12.0 | 1991 | 12.0 | 1992 | 12.0 | 1993 | 11.8 | 1994 | 11.8 | 1995 | 11.8 | 1996 | 11.8 | 1997 | 11.7 | 1998 | 11.7 | 1999 | 11.7 | 2000 | 11.7 |
| 1990 | 11.7 | 1991 | 11.7 | 1992 | 11.7 | 1993 | 11.5 | 1994 | 11.5 | 1995 | 11.5 | 1996 | 11.5 | 1997 | 11.4 | 1998 | 11.4 | 1999 | 11.4 | 2000 | 11.4 | 2001 | 11.4 |
| 1991 | 11.4 | 1992 | 11.4 | 1993 | 11.1 | 1994 | 11.1 | 1995 | 11.1 | 1996 | 11.1 | 1997 | 11.1 | 1998 | 11.1 | 1999 | 11.1 | 2000 | 11.1 | 2001 | 11.1 | 2002 | 11.1 |
| 1992 | 11.2 | 1993 | 11.0 | 1994 | 11.0 | 1995 | 11.0 | 1996 | 11.0 | 1997 | 10.9 | 1998 | 10.9 | 1999 | 10.9 | 2000 | 10.9 | 2001 | 10.9 | 2002 | 10.9 | 2003 | 10.9 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F. Emissions are based on the January 1 mileage accumulation figures given in Table 1.7.4.

## TABLE 1.7.3

## IDLE EMISSION RATES FOR
## LOW ALTITUDE
## HEAVY DUTY DIESEL POWERED VEHICLES

* IER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Min.) | Deterioration Rate (Gm/Min/10K Mi) |
|---|---|---|---|
| HC | Pre-1963 | 0.36 | 0.0 |
| | 1963-1965 | 0.36 | 0.0 |
| | 1966-1968 | 0.36 | 0.0 |
| | 1969-1971 | 0.36 | 0.0 |
| | 1972-1974 | 0.36 | 0.0 |
| | 1975-1979 | 0.36 | 0.0 |
| | 1980-1981 | 0.36 | 0.0 |
| | 1982-1984 | 0.36 | 0.0 |
| | 1985 | 0.27 | 0.0 |
| | 1986 | 0.27 | 0.0 |
| | 1987-1992 | 0.27 | 0.0 |
| | 1993-1996 | 0.27 | 0.0 |
| | 1997+ | 0.27 | 0.0 |
| CO | Pre-1963 | 0.67 | 0.01 |
| | 1963-1965 | 0.67 | 0.01 |
| | 1966-1968 | 0.67 | 0.01 |
| | 1969-1971 | 0.67 | 0.01 |
| | 1972-1974 | 0.67 | 0.01 |
| | 1975-1979 | 0.67 | 0.01 |
| | 1980-1981 | 0.67 | 0.01 |
| | 1982-1984 | 0.67 | 0.01 |
| | 1985 | 0.67 | 0.01 |
| | 1986 | 0.67 | 0.01 |
| | 1987-1992 | 0.67 | 0.01 |
| | 1993-1996 | 0.67 | 0.01 |
| | 1997+ | 0.67 | 0.01 |
| NOx | Pre-1963 | 0.92 | 0.0 |
| | 1963-1965 | 0.92 | 0.0 |
| | 1966-1968 | 0.92 | 0.0 |
| | 1969-1971 | 0.92 | 0.0 |
| | 1972-1974 | 0.92 | 0.0 |
| | 1975-1979 | 0.92 | 0.0 |
| | 1980-1981 | 0.92 | 0.0 |
| | 1982-1984 | 0.92 | 0.0 |
| | 1985 | 0.22 | 0.0 |
| | 1986 | 0.22 | 0.0 |
| | 1987-1992 | 0.22 | 0.0 |
| | 1993-1996 | 0.22 | 0.0 |
| | 1997+ | 0.22 | 0.0 |

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

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## TABLE 1.7.4

## REGISTRATION MIX AND MILEAGE ACCUMULATION RATES FOR LOW ALTITUDE HEAVY DUTY DIESEL POWERED VEHICLES

| Model Year Index** | July 1 Registration Mix* | Mileage Accumulation Rate per vehicle* | Jan 1 Registration Mix | Jan 1 Mileage Accumulation Rate (fleet) | Jan 1 Mileage Accumulation (fleet) |
|---|---|---|---|---|---|
| 1 | 0.090 | 66333. | 0.0 | 0. | 0. |
| 2 | 0.151 | 60319. | 0.151 | 66333. | 33166. |
| 3 | 0.126 | 54855. | 0.126 | 60319. | 96492. |
| 4 | 0.105 | 49894. | 0.105 | 54855. | 154079. |
| 5 | 0.088 | 45386. | 0.088 | 49894. | 206454. |
| 6 | 0.073 | 41288. | 0.073 | 45386. | 254093. |
| 7 | 0.061 | 37565. | 0.061 | 41288. | 297430. |
| 8 | 0.051 | 34182. | 0.051 | 37565. | 336857. |
| 9 | 0.043 | 31105. | 0.043 | 34182. | 372730. |
| 10 | 0.036 | 28309. | 0.036 | 31105. | 405374. |
| 11 | 0.030 | 25766. | 0.030 | 28309. | 435081. |
| 12 | 0.025 | 23453. | 0.025 | 25766. | 462118. |
| 13 | 0.021 | 21350. | 0.021 | 23453. | 486727. |
| 14 | 0.017 | 19437. | 0.017 | 21350. | 509129. |
| 15 | 0.014 | 17697. | 0.014 | 19437. | 529522. |
| 16 | 0.012 | 16114. | 0.012 | 17697. | 548089. |
| 17 | 0.010 | 14673. | 0.010 | 16114. | 564994. |
| 18 | 0.008 | 13363. | 0.008 | 14673. | 580388. |
| 19 | 0.007 | 12170. | 0.007 | 13363. | 594406. |
| 20+ | 0.031 | 11085. | 0.031 | 12170. | 607173. |

* Default information that may be altered by the MOBILE3 user with information about the local area. This mileage distribution is applicable to calendar year 1988 only.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

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## TABLE 1.7.5

## EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR
## LOW ALTITUDE
## HEAVY DUTY DIESEL POWERED VEHICLES
## JANUARY 1, 1988

| Model Years | (A) HDDV Fleet Registration | (B) Sales Fraction | (A*B) | (C=A*B/DAF) HDDV Registration | (D) Annual Mileage Accrual Rate | (C*D) | (C*D/TFNORM) Travel Fractions |
|---|---|---|---|---|---|---|---|
| 1988 | 0.0 | 1.000 | 0.0 | 0.0 | 0. | 0.0 | 0.0 |
| 1987 | 0.151 | 1.000 | 0.151 | 0.166 | 66333. | 11019.0 | 0.240 |
| 1986 | 0.126 | 1.000 | 0.126 | 0.139 | 60319. | 8361.1 | 0.182 |
| 1985 | 0.105 | 1.000 | 0.105 | 0.116 | 54855. | 6336.4 | 0.138 |
| 1984 | 0.088 | 1.000 | 0.088 | 0.097 | 49894. | 4830.2 | 0.105 |
| 1983 | 0.073 | 1.000 | 0.073 | 0.080 | 45386. | 3644.8 | 0.079 |
| 1982 | 0.061 | 1.000 | 0.061 | 0.067 | 41288. | 2770.7 | 0.060 |
| 1981 | 0.051 | 1.000 | 0.051 | 0.056 | 37565. | 2107.6 | 0.046 |
| 1980 | 0.043 | 1.000 | 0.043 | 0.047 | 34182. | 1617.0 | 0.035 |
| 1979 | 0.036 | 1.000 | 0.036 | 0.040 | 31105. | 1231.9 | 0.027 |
| 1978 | 0.030 | 1.000 | 0.030 | 0.033 | 28309. | 934.3 | 0.020 |
| 1977 | 0.025 | 1.000 | 0.025 | 0.028 | 25766. | 708.6 | 0.015 |
| 1976 | 0.021 | 1.000 | 0.021 | 0.023 | 23453. | 541.8 | 0.012 |
| 1975 | 0.017 | 1.000 | 0.017 | 0.019 | 21350. | 399.3 | 0.009 |
| 1974 | 0.014 | 1.000 | 0.014 | 0.015 | 19437. | 299.4 | 0.007 |
| 1973 | 0.012 | 1.000 | 0.012 | 0.013 | 17697. | 233.6 | 0.005 |
| 1972 | 0.010 | 1.000 | 0.010 | 0.011 | 16114. | 177.3 | 0.004 |
| 1971 | 0.008 | 1.000 | 0.008 | 0.009 | 14673. | 129.1 | 0.003 |
| 1970 | 0.007 | 1.000 | 0.007 | 0.008 | 13363. | 102.9 | 0.002 |
| 1969- | 0.031 | 1.000 | 0.031 | 0.034 | 12170. | 415.1 | 0.009 |
|  |  | DAF: | 0.910 |  | TFNORM: | 45860.0 |  |

WHERE :

A = January 1 registration mix from Table 1.7.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 1.7.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI) = .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

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## TABLE 1.7.6

## SPEED CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE HEAVY DUTY DIESEL POWERED VEHICLES

$* \ SCF(s) = EXP(A + B*s + C*s^2)$

| Pol | Model Years | Coefficients A | B | C |
|---|---|---|---|---|
| HC | All | 0.92400 | -0.05500 | 0.00044 |
| CO | All | 1.39600 | -0.08800 | 0.00091 |
| NOx | All | 0.67600 | -0.04800 | 0.00071 |

* WHERE: s = average speed (mph)

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## TABLE 1.8.1A

## EXHAUST EMISSION RATES FOR
## LOW ALTITUDE
## MOTORCYCLES
## (RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Mile) | Deterioration Rate (Gm/Mi/10K Mi) | 50,000 Mile Emission Level (Grams/Mile) |
|---|---|---|---|---|
| HC | Pre-1978 | 8.90 | 0.78 | 12.80 |
| | 1978-1979 | 3.40 | 1.65 | 11.65 |
| | 1980+ | 2.70 | 1.73 | 11.35 |
| CO | Pre-1978 | 34.30 | 2.47 | 46.65 |
| | 1978-1979 | 23.10 | 3.96 | 42.90 |
| | 1980+ | 18.50 | 2.02 | 28.60 |
| NOx | Pre-1978 | 0.20 | 0.06 | 0.50 |
| | 1978-1979 | 0.65 | 0.0 | 0.65 |
| | 1980+ | 0.85 | 0.0 | 0.85 |

* WHERE : BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

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## TABLE 1.8.1B

## CRANKCASE AND EVAPORATIVE HYDROCARBON EMISSIONS FOR LOW ALTITUDE MOTORCYCLES (RATES REFLECT ZERO TAMPERING)

** CCEV = (HSK * TPD + DNL)/MPD + CC

| Model Years | SHED Hot Soak Emissions (Gm/Trip) | Trips* Per Day | SHED Diurnal Emissions (Gm/Day) | Miles* Per Day | Crankcase Emissions (Gm/Mile) | Total Crankcase and Evap. Emissions (Gm/Mile) |
|---|---|---|---|---|---|---|
| Pre-1978 | 4.56 | 1.35 | 6.71 | 8.30 | 0.31 | 1.86 |
| 1978-1979 | 7.00 | 1.35 | 8.44 | 8.30 | 0.0 | 2.16 |
| 1980+ | 7.53 | 1.35 | 8.60 | 8.30 | 0.0 | 2.26 |

* Default information that may be altered by the MOBILE3 user with information about the local area.

** WHERE :

CCEV = Total untampered crankcase & evaporative HC emissions (Gm/Mile)
HSK = Hot soak emissions (Gm/Trip)
TPD = Trips per day
DNL = Diurnal emissions (Gm/Day)
MPD = Miles per day
CC = Crankcase emissions (Gm/Mile)

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TABLE 1.8.2A

DATE : MAY 25, 1985

## EXHAUST EMISSION LEVELS FOR LOW ALTITUDE MOTORCYCLES TOTAL HC (INCLUDES EVAP & CRANKCASE)

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 11.9 | 1962 | 11.9 | 1963 | 11.9 | 1964 | 11.9 | 1965 | 11.9 | 1966 | 11.9 | 1967 | 11.9 | 1968 | 11.9 | 1969 | 11.9 | 1970 | 11.9 | 1971 | 11.9 | 1972 | 11.9 |
| 1962 | 11.9 | 1963 | 11.9 | 1964 | 11.9 | 1965 | 11.9 | 1966 | 11.9 | 1967 | 11.9 | 1968 | 11.9 | 1969 | 11.9 | 1970 | 11.9 | 1971 | 11.9 | 1972 | 11.9 | 1973 | 11.9 |
| 1963 | 11.9 | 1964 | 11.9 | 1965 | 11.9 | 1966 | 11.9 | 1967 | 11.9 | 1968 | 11.9 | 1969 | 11.9 | 1970 | 11.9 | 1971 | 11.9 | 1972 | 11.9 | 1973 | 11.9 | 1974 | 11.9 |
| 1964 | 11.9 | 1965 | 11.9 | 1966 | 11.9 | 1967 | 11.9 | 1968 | 11.9 | 1969 | 11.9 | 1970 | 11.9 | 1971 | 11.9 | 1972 | 11.9 | 1973 | 11.9 | 1974 | 11.9 | 1975 | 11.9 |
| 1965 | 11.9 | 1966 | 11.9 | 1967 | 11.9 | 1968 | 11.9 | 1969 | 11.9 | 1970 | 11.9 | 1971 | 11.9 | 1972 | 11.9 | 1973 | 11.9 | 1974 | 11.9 | 1975 | 11.9 | 1976 | 11.9 |
| 1966 | 11.9 | 1967 | 11.9 | 1968 | 11.9 | 1969 | 11.9 | 1970 | 11.9 | 1971 | 11.9 | 1972 | 11.9 | 1973 | 11.9 | 1974 | 11.9 | 1975 | 11.9 | 1976 | 11.9 | 1977 | 11.9 |
| 1967 | 11.9 | 1968 | 11.9 | 1969 | 11.9 | 1970 | 11.9 | 1971 | 11.9 | 1972 | 11.9 | 1973 | 11.9 | 1974 | 11.9 | 1975 | 11.9 | 1976 | 11.9 | 1977 | 11.9 | 1978 | 7.9 |
| 1968 | 11.9 | 1969 | 11.9 | 1970 | 11.9 | 1971 | 11.9 | 1972 | 11.9 | 1973 | 11.9 | 1974 | 11.9 | 1975 | 11.9 | 1976 | 11.9 | 1977 | 11.9 | 1978 | 7.9 | 1979 | 7.9 |
| 1969 | 11.9 | 1970 | 11.9 | 1971 | 11.9 | 1972 | 11.9 | 1973 | 11.9 | 1974 | 11.9 | 1975 | 11.9 | 1976 | 11.9 | 1977 | 11.9 | 1978 | 7.9 | 1979 | 7.9 | 1980 | 7.4 |
| 1970 | 11.8 | 1971 | 11.8 | 1972 | 11.8 | 1973 | 11.8 | 1974 | 11.8 | 1975 | 11.8 | 1976 | 11.8 | 1977 | 11.8 | 1978 | 7.8 | 1979 | 7.8 | 1980 | 7.4 | 1981 | 7.4 |
| 1971 | 11.8 | 1972 | 11.8 | 1973 | 11.8 | 1974 | 11.8 | 1975 | 11.8 | 1976 | 11.8 | 1977 | 11.8 | 1978 | 7.8 | 1979 | 7.8 | 1980 | 7.3 | 1981 | 7.3 | 1982 | 7.3 |
| 1972 | 11.8 | 1973 | 11.8 | 1974 | 11.8 | 1975 | 11.8 | 1976 | 11.8 | 1977 | 11.8 | 1978 | 7.8 | 1979 | 7.8 | 1980 | 7.3 | 1981 | 7.3 | 1982 | 7.3 | 1983 | 7.3 |
| 1973 | 11.8 | 1974 | 11.8 | 1975 | 11.8 | 1976 | 11.8 | 1977 | 11.8 | 1978 | 7.7 | 1979 | 7.7 | 1980 | 7.2 | 1981 | 7.2 | 1982 | 7.2 | 1983 | 7.2 | 1984 | 7.2 |
| 1974 | 11.7 | 1975 | 11.7 | 1976 | 11.7 | 1977 | 11.7 | 1978 | 7.6 | 1979 | 7.6 | 1980 | 7.1 | 1981 | 7.1 | 1982 | 7.1 | 1983 | 7.1 | 1984 | 7.1 | 1985 | 7.1 |
| 1975 | 11.6 | 1976 | 11.6 | 1977 | 11.6 | 1978 | 7.4 | 1979 | 7.4 | 1980 | 6.9 | 1981 | 6.9 | 1982 | 6.9 | 1983 | 6.9 | 1984 | 6.9 | 1985 | 6.9 | 1986 | 6.9 |
| 1976 | 11.5 | 1977 | 11.5 | 1978 | 7.2 | 1979 | 7.2 | 1980 | 6.7 | 1981 | 6.7 | 1982 | 6.7 | 1983 | 6.7 | 1984 | 6.7 | 1985 | 6.7 | 1986 | 6.7 | 1987 | 6.7 |
| 1977 | 11.4 | 1978 | 6.9 | 1979 | 6.9 | 1980 | 6.3 | 1981 | 6.3 | 1982 | 6.3 | 1983 | 6.3 | 1984 | 6.3 | 1985 | 6.3 | 1986 | 6.3 | 1987 | 6.3 | 1988 | 6.3 |
| 1978 | 6.5 | 1979 | 6.5 | 1980 | 5.9 | 1981 | 5.9 | 1982 | 5.9 | 1983 | 5.9 | 1984 | 5.9 | 1985 | 5.9 | 1986 | 5.9 | 1987 | 5.9 | 1988 | 5.9 | 1989 | 5.9 |
| 1979 | 5.9 | 1980 | 5.3 | 1981 | 5.3 | 1982 | 5.3 | 1983 | 5.3 | 1984 | 5.3 | 1985 | 5.3 | 1986 | 5.3 | 1987 | 5.3 | 1988 | 5.3 | 1989 | 5.3 | 1990 | 5.3 |
| 1980 | 5.0 | 1981 | 5.0 | 1982 | 5.0 | 1983 | 5.0 | 1984 | 5.0 | 1985 | 5.0 | 1986 | 5.0 | 1987 | 5.0 | 1988 | 5.0 | 1989 | 5.0 | 1990 | 5.0 | 1991 | 5.0 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 11.9 | 1974 | 11.9 | 1975 | 11.9 | 1976 | 11.9 | 1977 | 11.9 | 1978 | 7.9 | 1979 | 7.9 | 1980 | 7.4 | 1981 | 7.4 | 1982 | 7.4 | 1983 | 7.4 | 1984 | 7.4 |
| 1974 | 11.9 | 1975 | 11.9 | 1976 | 11.9 | 1977 | 11.9 | 1978 | 7.9 | 1979 | 7.9 | 1980 | 7.4 | 1981 | 7.4 | 1982 | 7.4 | 1983 | 7.4 | 1984 | 7.4 | 1985 | 7.4 |
| 1975 | 11.9 | 1976 | 11.9 | 1977 | 11.9 | 1978 | 7.9 | 1979 | 7.9 | 1980 | 7.4 | 1981 | 7.4 | 1982 | 7.4 | 1983 | 7.4 | 1984 | 7.4 | 1985 | 7.4 | 1986 | 7.4 |
| 1976 | 11.9 | 1977 | 11.9 | 1978 | 7.9 | 1979 | 7.9 | 1980 | 7.4 | 1981 | 7.4 | 1982 | 7.4 | 1983 | 7.4 | 1984 | 7.4 | 1985 | 7.4 | 1986 | 7.4 | 1987 | 7.4 |
| 1977 | 11.9 | 1978 | 7.9 | 1979 | 7.9 | 1980 | 7.4 | 1981 | 7.4 | 1982 | 7.4 | 1983 | 7.4 | 1984 | 7.4 | 1985 | 7.4 | 1986 | 7.4 | 1987 | 7.4 | 1988 | 7.4 |
| 1978 | 7.9 | 1979 | 7.9 | 1980 | 7.4 | 1981 | 7.4 | 1982 | 7.4 | 1983 | 7.4 | 1984 | 7.4 | 1985 | 7.4 | 1986 | 7.4 | 1987 | 7.4 | 1988 | 7.4 | 1989 | 7.4 |
| 1979 | 7.9 | 1980 | 7.4 | 1981 | 7.4 | 1982 | 7.4 | 1983 | 7.4 | 1984 | 7.4 | 1985 | 7.4 | 1986 | 7.4 | 1987 | 7.4 | 1988 | 7.4 | 1989 | 7.4 | 1990 | 7.4 |
| 1980 | 7.4 | 1981 | 7.4 | 1982 | 7.4 | 1983 | 7.4 | 1984 | 7.4 | 1985 | 7.4 | 1986 | 7.4 | 1987 | 7.4 | 1988 | 7.4 | 1989 | 7.4 | 1990 | 7.4 | 1991 | 7.4 |
| 1981 | 7.4 | 1982 | 7.4 | 1983 | 7.4 | 1984 | 7.4 | 1985 | 7.4 | 1986 | 7.4 | 1987 | 7.4 | 1988 | 7.4 | 1989 | 7.4 | 1990 | 7.4 | 1991 | 7.4 | 1992 | 7.4 |
| 1982 | 7.4 | 1983 | 7.4 | 1984 | 7.4 | 1985 | 7.4 | 1986 | 7.4 | 1987 | 7.4 | 1988 | 7.4 | 1989 | 7.4 | 1990 | 7.4 | 1991 | 7.4 | 1992 | 7.4 | 1993 | 7.4 |
| 1983 | 7.3 | 1984 | 7.3 | 1985 | 7.3 | 1986 | 7.3 | 1987 | 7.3 | 1988 | 7.3 | 1989 | 7.3 | 1990 | 7.3 | 1991 | 7.3 | 1992 | 7.3 | 1993 | 7.3 | 1994 | 7.3 |
| 1984 | 7.3 | 1985 | 7.3 | 1986 | 7.3 | 1987 | 7.3 | 1988 | 7.3 | 1989 | 7.3 | 1990 | 7.3 | 1991 | 7.3 | 1992 | 7.3 | 1993 | 7.3 | 1994 | 7.3 | 1995 | 7.3 |
| 1985 | 7.2 | 1986 | 7.2 | 1987 | 7.2 | 1988 | 7.2 | 1989 | 7.2 | 1990 | 7.2 | 1991 | 7.2 | 1992 | 7.2 | 1993 | 7.2 | 1994 | 7.2 | 1995 | 7.2 | 1996 | 7.2 |
| 1986 | 7.1 | 1987 | 7.1 | 1988 | 7.1 | 1989 | 7.1 | 1990 | 7.1 | 1991 | 7.1 | 1992 | 7.1 | 1993 | 7.1 | 1994 | 7.1 | 1995 | 7.1 | 1996 | 7.1 | 1997 | 7.1 |
| 1987 | 6.9 | 1988 | 6.9 | 1989 | 6.9 | 1990 | 6.9 | 1991 | 6.9 | 1992 | 6.9 | 1993 | 6.9 | 1994 | 6.9 | 1995 | 6.9 | 1996 | 6.9 | 1997 | .9 | 1998 | 6.9 |
| 1988 | 6.7 | 1985 | 6.7 | 1990 | 6.7 | 1991 | 6.7 | 1992 | 6.7 | 1993 | 6.7 | 1994 | 6.7 | 1995 | 6.7 | 1996 | 6.7 | 1997 | 6.7 | 1998 | 6.7 | 1999 | 6.7 |
| 1989 | 6.3 | 1990 | 6.3 | 1991 | 6.3 | 1992 | 6.3 | 1993 | 6.3 | 1994 | 6.3 | 1995 | 6.3 | 1996 | 6.3 | 1997 | 6.3 | 1998 | 6.3 | 1999 | 6.3 | 2000 | 6.3 |
| 1990 | 5.9 | 1991 | 5.9 | 1992 | 5.9 | 1993 | 5.9 | 1994 | 5.9 | 1995 | 5.9 | 1996 | 5.9 | 1997 | 5.9 | 1998 | 5.9 | 1999 | 5.9 | 2000 | 5.9 | 2001 | 5.9 |
| 1991 | 5.3 | 1992 | 5.3 | 1993 | 5.3 | 1994 | 5.3 | 1995 | 5.3 | 1996 | 5.3 | 1997 | 5.3 | 1998 | 5.3 | 1999 | 5.3 | 2000 | 5.3 | 2001 | 5.3 | 2002 | 5.3 |
| 1992 | 5.0 | 1993 | 5.0 | 1994 | 5.0 | 1995 | 5.0 | 1996 | 5.0 | 1997 | 5.0 | 1998 | 5.0 | 1999 | 5.0 | 2000 | 5.0 | 2001 | 5.0 | 2002 | 5.0 | 2003 | 5.0 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.8.4.

TABLE 1.8.2B

DATE : MAY 25, 1985

## EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
## MOTORCYCLES
## CO

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 37.8 | 1962 | 37.8 | 1963 | 37.8 | 1964 | 37.8 | 1965 | 37.8 | 1966 | 37.8 | 1967 | 37.8 | 1968 | 37.8 | 1969 | 37.8 | 1970 | 37.8 | 1971 | 37.8 | 1972 | 37.8 |
| 1962 | 37.8 | 1963 | 37.8 | 1964 | 37.8 | 1965 | 37.8 | 1966 | 37.8 | 1967 | 37.8 | 1968 | 37.8 | 1969 | 37.8 | 1970 | 37.8 | 1971 | 37.8 | 1972 | 37.8 | 1973 | 37.8 |
| 1963 | 37.8 | 1964 | 37.8 | 1965 | 37.8 | 1966 | 37.8 | 1967 | 37.8 | 1968 | 37.8 | 1969 | 37.8 | 1970 | 37.8 | 1971 | 37.8 | 1972 | 37.8 | 1973 | 37.8 | 1974 | 37.8 |
| 1964 | 37.8 | 1965 | 37.8 | 1966 | 37.8 | 1967 | 37.8 | 1968 | 37.8 | 1969 | 37.8 | 1970 | 37.8 | 1971 | 37.8 | 1972 | 37.8 | 1973 | 37.8 | 1974 | 37.8 | 1975 | 37.8 |
| 1965 | 37.8 | 1966 | 37.8 | 1967 | 37.8 | 1968 | 37.8 | 1969 | 37.8 | 1970 | 37.8 | 1971 | 37.8 | 1972 | 37.8 | 1973 | 37.8 | 1974 | 37.8 | 1975 | 37.8 | 1976 | 37.8 |
| 1966 | 37.8 | 1967 | 37.8 | 1968 | 37.8 | 1969 | 37.8 | 1970 | 37.8 | 1971 | 37.8 | 1972 | 37.8 | 1973 | 37.8 | 1974 | 37.8 | 1975 | 37.8 | 1976 | 37.8 | 1977 | 37.8 |
| 1967 | 37.8 | 1968 | 37.8 | 1969 | 37.8 | 1970 | 37.8 | 1971 | 37.8 | 1972 | 37.8 | 1973 | 37.8 | 1974 | 37.8 | 1975 | 37.8 | 1976 | 37.8 | 1977 | 37.8 | 1978 | 28.7 |
| 1968 | 37.8 | 1969 | 37.8 | 1970 | 37.8 | 1971 | 37.8 | 1972 | 37.8 | 1973 | 37.8 | 1974 | 37.8 | 1975 | 37.8 | 1976 | 37.8 | 1977 | 37.8 | 1978 | 28.7 | 1979 | 28.7 |
| 1969 | 37.8 | 1970 | 37.8 | 1971 | 37.8 | 1972 | 37.8 | 1973 | 37.8 | 1974 | 37.8 | 1975 | 37.8 | 1976 | 37.8 | 1977 | 37.8 | 1978 | 28.7 | 1979 | 28.7 | 1980 | 21.3 |
| 1970 | 37.7 | 1971 | 37.7 | 1972 | 37.7 | 1973 | 37.7 | 1974 | 37.7 | 1975 | 37.7 | 1976 | 37.7 | 1977 | 37.7 | 1978 | 28.6 | 1979 | 28.6 | 1980 | 21.3 | 1981 | 21.3 |
| 1971 | 37.7 | 1972 | 37.7 | 1973 | 37.7 | 1974 | 37.7 | 1975 | 37.7 | 1976 | 37.7 | 1977 | 37.7 | 1978 | 28.5 | 1979 | 28.5 | 1980 | 21.3 | 1981 | 21.3 | 1982 | 21.3 |
| 1972 | 37.6 | 1973 | 37.6 | 1974 | 37.6 | 1975 | 37.6 | 1976 | 37.6 | 1977 | 37.6 | 1978 | 28.4 | 1979 | 28.4 | 1980 | 21.2 | 1981 | 21.2 | 1982 | 21.2 | 1983 | 21.2 |
| 1973 | 37.5 | 1974 | 37.5 | 1975 | 37.5 | 1976 | 37.5 | 1977 | 37.5 | 1978 | 28.2 | 1979 | 28.2 | 1980 | 21.1 | 1981 | 21.1 | 1982 | 21.1 | 1983 | 21.1 | 1984 | 21.1 |
| 1974 | 37.3 | 1975 | 37.3 | 1976 | 37.3 | 1977 | 37.3 | 1978 | 27.9 | 1979 | 27.9 | 1980 | 21.0 | 1981 | 21.0 | 1982 | 21.0 | 1983 | 21.0 | 1984 | 21.0 | 1985 | 21.0 |
| 1975 | 37.0 | 1976 | 37.0 | 1977 | 37.0 | 1978 | 27.5 | 1979 | 27.5 | 1980 | 20.8 | 1981 | 20.8 | 1982 | 20.8 | 1983 | 20.8 | 1984 | 20.8 | 1985 | 20.8 | 1986 | 20.8 |
| 1976 | 36.7 | 1977 | 36.7 | 1978 | 27.0 | 1979 | 27.0 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 20.5 | 1983 | 20.5 | 1984 | 20.5 | 1985 | 20.5 | 1986 | 20.5 | 1987 | 20.5 |
| 1977 | 36.2 | 1978 | 26.2 | 1979 | 26.2 | 1980 | 20.1 | 1981 | 20.1 | 1982 | 20.1 | 1983 | 20.1 | 1984 | 20.1 | 1985 | 20.1 | 1986 | 20.1 | 1987 | 20.1 | 1988 | 20.1 |
| 1978 | 25.3 | 1979 | 25.3 | 1980 | 19.6 | 1981 | 19.6 | 1982 | 19.6 | 1983 | 19.6 | 1984 | 19.6 | 1985 | 19.6 | 1986 | 19.6 | 1987 | 19.6 | 1988 | 19.6 | 1989 | 19.6 |
| 1979 | 23.9 | 1980 | 18.9 | 1981 | 18.9 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.9 | 1986 | 18.9 | 1987 | 18.9 | 1988 | 18.9 | 1989 | 18.9 | 1990 | 18.9 |
| 1980 | 18.5 | 1981 | 18.5 | 1982 | 18.5 | 1983 | 18.5 | 1984 | 18.5 | 1985 | 18.5 | 1986 | 18.5 | 1987 | 18.5 | 1988 | 18.5 | 1989 | 18.5 | 1990 | 18.5 | 1991 | 18.5 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 37.8 | 1974 | 37.8 | 1975 | 37.8 | 1976 | 37.8 | 1977 | 37.8 | 1978 | 28.7 | 1979 | 28.7 | 1980 | 21.4 | 1981 | 21.4 | 1982 | 21.4 | 1983 | 21.4 | 1984 | 21.4 |
| 1974 | 37.8 | 1975 | 37.8 | 1976 | 37.8 | 1977 | 37.8 | 1978 | 28.7 | 1979 | 28.7 | 1980 | 21.4 | 1981 | 21.4 | 1982 | 21.4 | 1983 | 21.4 | 1984 | 21.4 | 1985 | 21.4 |
| 1975 | 37.8 | 1976 | 37.8 | 1977 | 37.8 | 1978 | 28.7 | 1979 | 28.7 | 1980 | 21.4 | 1981 | 21.4 | 1982 | 21.4 | 1983 | 21.4 | 1984 | 21.4 | 1985 | 21.4 | 1986 | 21.4 |
| 1976 | 37.8 | 1977 | 37.8 | 1978 | 28.7 | 1979 | 28.7 | 1980 | 21.4 | 1981 | 21.4 | 1982 | 21.4 | 1983 | 21.4 | 1984 | 21.4 | 1985 | 21.4 | 1986 | 21.4 | 1987 | 21.4 |
| 1977 | 37.8 | 1978 | 28.7 | 197S | 28.7 | 1980 | 21.4 | 1981 | 21.4 | 1982 | 21.4 | 1983 | 21.4 | 1984 | 21.4 | 1985 | 21.4 | 1986 | 21.4 | 1987 | 21.4 | 1988 | 21.4 |
| 1978 | 28.7 | 1979 | 28.7 | 1980 | 21.4 | 1981 | 21.4 | 1982 | 21.4 | 1983 | 21.4 | 1984 | 21.4 | 1985 | 21.4 | 1986 | 21.4 | 1987 | 21.4 | 1988 | 21.4 | 1989 | 21.4 |
| 1979 | 28.7 | 1980 | 21.4 | 1981 | 21.4 | 1982 | 21.4 | 1983 | 21.4 | 1984 | 21.4 | 1985 | 21.4 | 1986 | 21.4 | 1987 | 21.4 | 1988 | 21.4 | 1989 | 21.4 | 1990 | 21.4 |
| 1980 | 21.4 | 1981 | 21.4 | 1982 | 21.4 | 1983 | 21.4 | 1984 | 21.4 | 1985 | 21.4 | 1986 | 21.4 | 1987 | 21.4 | 1988 | 21.4 | 1989 | 21.4 | 1990 | 21.4 | 1991 | 21.4 |
| 1981 | 21.3 | 1982 | 21.3 | 1983 | 21.3 | 1984 | 21.3 | 1985 | 21.3 | 1986 | 21.3 | 1987 | 21.3 | 1988 | 21.3 | 1989 | 21.3 | 1990 | 21.3 | 1991 | 21.3 | 1992 | 21.3 |
| 1982 | 21.3 | 1983 | 21.3 | 1984 | 21.3 | 1985 | 21.3 | 1986 | 21.3 | 1987 | 21.3 | 1988 | 21.3 | 1989 | 21.3 | 1990 | 21.3 | 1991 | 21.3 | 1992 | 21.3 | 1993 | 21.3 |
| 1983 | 21.3 | 1984 | 21.3 | 1985 | 21.3 | 1986 | 21.3 | 1987 | 21.3 | 1988 | 21.3 | 1989 | 21.3 | 1990 | 21.3 | 1991 | 21.3 | 1992 | 21.3 | 1993 | 21.3 | 1994 | 21.3 |
| 1984 | 21.2 | 1985 | 21.2 | 1986 | 21.2 | 1987 | 21.2 | 1988 | 21.2 | 1989 | 21.2 | 1990 | 21.2 | 1991 | 21.2 | 1992 | 21.2 | 1993 | 21.2 | 1994 | 21.2 | 1995 | 21.2 |
| 1985 | 21.1 | 1986 | 21.1 | 1987 | 21.1 | 1988 | 21.1 | 1989 | 21.1 | 1990 | 21.1 | 1991 | 21.1 | 1992 | 21.1 | 1993 | 21.1 | 1994 | 21.1 | 1995 | 21.1 | 1996 | 21.1 |
| 1986 | 21.0 | 1987 | 21.0 | 1988 | 21.0 | 1989 | 21.0 | 1990 | 21.0 | 1991 | 21.0 | 1992 | 21.0 | 1993 | 21.0 | 1994 | 21.0 | 1995 | 21.0 | 1996 | 21.0 | 1997 | 21.0 |
| 1987 | 20.8 | 1988 | 20.8 | 1989 | 20.8 | 1990 | 20.8 | 1991 | 20.8 | 1992 | 20.8 | 1993 | 20.8 | 1994 | 20.8 | 1995 | 20.8 | 1996 | 20.8 | 1997 | 20.8 | 1998 | 20.8 |
| 1988 | 20.5 | 1989 | 20.5 | 1990 | 20.5 | 1991 | 20.5 | 1992 | 20.5 | 1993 | 20.5 | 1994 | 20.5 | 1995 | 20.5 | 1996 | 20.5 | 1997 | 20.5 | 1998 | 20.5 | 1999 | 20.5 |
| 1989 | 20.1 | 1990 | 20.1 | 1991 | 20.1 | 1992 | 20.1 | 1993 | 20.1 | 1994 | 20.1 | 1995 | 20.1 | 1996 | 20.1 | 1997 | 20.1 | 1998 | 20.1 | 1999 | 20.1 | 2000 | 20.1 |
| 1990 | 19.6 | 1991 | 19.6 | 1992 | 19.6 | 1993 | 19.6 | 1994 | 19.6 | 1995 | 19.6 | 1996 | 19.6 | 1997 | 19.6 | 1998 | 19.6 | 1999 | 19.6 | 2000 | 19.6 | 2001 | 19.6 |
| 1991 | 18.9 | 1992 | 18.9 | 1993 | 18.9 | 1994 | 18.9 | 1995 | 18.9 | 1996 | 18.9 | 1997 | 18.9 | 1998 | 18.9 | 1999 | 18.9 | 2000 | 18.9 | 2001 | 18.9 | 2002 | 18.9 |
| 1992 | 18.5 | 1993 | 18.5 | 1994 | 18.5 | 1995 | 18.5 | 1996 | 18.5 | 1997 | 18.5 | 1998 | 18.5 | 1999 | 18.5 | 2000 | 18.5 | 2001 | 18.5 | 2002 | 18.5 | 2003 | 18.5 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.8.4.

TABLE 1.8.2C

DATE : MAY 25, 1985

# EXHAUST EMISSION LEVELS FOR LOW ALTITUDE
## MOTORCYCLES
## NOx

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 0.3 | 1962 | 0.3 | 1963 | 0.3 | 1964 | 0.3 | 1965 | 0.3 | 1966 | 0.3 | 1967 | 0.3 | 1968 | 0.3 | 1969 | 0.3 | 1970 | 0.3 | 1971 | 0.3 | 1972 | 0.3 |
| 1962 | 0.3 | 1963 | 0.3 | 1964 | 0.3 | 1965 | 0.3 | 1966 | 0.3 | 1967 | 0.3 | 1968 | 0.3 | 1969 | 0.3 | 1970 | 0.3 | 1971 | 0.3 | 1972 | 0.3 | 1973 | 0.3 |
| 1963 | 0.3 | 1964 | 0.3 | 1965 | 0.3 | 1966 | 0.3 | 1967 | 0.3 | 1968 | 0.3 | 1969 | 0.3 | 1970 | 0.3 | 1971 | 0.3 | 1972 | 0.3 | 1973 | 0.3 | 1974 | 0.3 |
| 1964 | 0.3 | 1965 | 0.3 | 1966 | 0.3 | 1967 | 0.3 | 1968 | 0.3 | 1969 | 0.3 | 1970 | 0.3 | 1971 | 0.3 | 1972 | 0.3 | 1973 | 0.3 | 1974 | 0.3 | 1975 | 0.3 |
| 1965 | 0.3 | 1966 | 0.3 | 1967 | 0.3 | 1968 | 0.3 | 1969 | 0.3 | 1970 | 0.3 | 1971 | 0.3 | 1972 | 0.3 | 1973 | 0.3 | 1974 | 0.3 | 1975 | 0.3 | 1976 | 0.3 |
| 1966 | 0.3 | 1967 | 0.3 | 1968 | 0.3 | 1969 | 0.3 | 1970 | 0.3 | 1971 | 0.3 | 1972 | 0.3 | 1973 | 0.3 | 1974 | 0.3 | 1975 | 0.3 | 1976 | 0.3 | 1977 | 0.3 |
| 1967 | 0.3 | 1968 | 0.3 | 1969 | 0.3 | 1970 | 0.3 | 1971 | 0.3 | 1972 | 0.3 | 1973 | 0.3 | 1974 | 0.3 | 1975 | 0.3 | 1976 | 0.3 | 1977 | 0.3 | 1978 | 0.6 |
| 1968 | 0.3 | 1969 | 0.3 | 1970 | 0.3 | 1971 | 0.3 | 1972 | 0.3 | 1973 | 0.3 | 1974 | 0.3 | 1975 | 0.3 | 1976 | 0.3 | 1977 | 0.3 | 1978 | 0.6 | 1979 | 0.6 |
| 1969 | 0.3 | 1970 | 0.3 | 1971 | 0.3 | 1972 | 0.3 | 1973 | 0.3 | 1974 | 0.3 | 1975 | 0.3 | 1976 | 0.3 | 1977 | 0.3 | 1978 | 0.6 | 1979 | 0.6 | 1980 | 0.8 |
| 1970 | 0.3 | 1971 | 0.3 | 1972 | 0.3 | 1973 | 0.3 | 1974 | 0.3 | 1975 | 0.3 | 1976 | 0.3 | 1977 | 0.3 | 1978 | 0.6 | 1979 | 0.6 | 1980 | 0.8 | 1981 | 0.8 |
| 1971 | 0.3 | 1972 | 0.3 | 1973 | 0.3 | 1974 | 0.3 | 1975 | 0.3 | 1976 | 0.3 | 1977 | 0.3 | 1978 | 0.6 | 1979 | 0.6 | 1980 | 0.8 | 1981 | 0.8 | 1982 | 0.8 |
| 1972 | 0.3 | 1973 | 0.3 | 1974 | 0.3 | 1975 | 0.3 | 1976 | 0.3 | 1977 | 0.3 | 1978 | 0.6 | 1979 | 0.6 | 1980 | 0.8 | 1981 | 0.8 | 1982 | 0.8 | 1983 | 0.8 |
| 1973 | 0.3 | 1974 | 0.3 | 1975 | 0.3 | 1976 | 0.3 | 1977 | 0.3 | 1978 | 0.6 | 1979 | 0.6 | 1980 | 0.8 | 1981 | 0.8 | 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.8 |
| 1974 | 0.3 | 1975 | 0.3 | 1976 | 0.3 | 1977 | 0.3 | 1978 | 0.6 | 1979 | 0.6 | 1980 | 0.8 | 1981 | 0.8 | 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.8 | 1985 | 0.8 |
| 1975 | 0.3 | 1976 | 0.3 | 1977 | 0.3 | 1978 | 0.6 | 1979 | 0.6 | 1980 | 0.8 | 1981 | 0.8 | 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.8 | 1985 | 0.8 | 1986 | 0.8 |
| 1976 | 0.3 | 1977 | 0.3 | 1978 | 0.6 | 1979 | 0.6 | 1980 | 0.8 | 1981 | 0.8 | 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.8 | 1985 | 0.8 | 1986 | 0.8 | 1987 | 0.8 |
| 1977 | 0.2 | 1978 | 0.6 | 1979 | 0.6 | 1980 | 0.8 | 1981 | 0.8 | 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.8 | 1985 | 0.8 | 1986 | 0.8 | 1987 | 0.8 | 1988 | 0.8 |
| 1978 | 0.6 | 1979 | 0.6 | 1980 | 0.8 | 1981 | 0.8 | 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.8 | 1985 | 0.8 | 1986 | 0.8 | 1987 | 0.8 | 1988 | 0.8 | 1989 | 0.8 |
| 1979 | 0.6 | 1980 | 0.8 | 1981 | 0.8 | 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.8 | 1985 | 0.8 | 1986 | 0.8 | 1987 | 0.8 | 1988 | 0.8 | 1989 | 0.8 | 1990 | 0.8 |
| 1980 | 0.8 | 1981 | 0.8 | 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.8 | 1985 | 0.8 | 1986 | 0.8 | 1987 | 0.8 | 1988 | 0.8 | 1989 | 0.8 | 1990 | 0.8 | 1991 | 0.8 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 0.3 | 1974 | 0.3 | 1975 | 0.3 | 1976 | 0.3 | 1977 | 0.3 | 1978 | 0.6 | 1979 | 0.6 | 1980 | 0.8 | 1981 | 0.8 | 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.8 |
| 1974 | 0.3 | 1975 | 0.3 | 1976 | 0.3 | 1977 | 0.3 | 1978 | 0.6 | 1979 | 0.6 | 1980 | 0.8 | 1981 | 0.8 | 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.8 | 1985 | 0.8 |
| 1975 | 0.3 | 1976 | 0.3 | 1977 | 0.3 | 1978 | 0.6 | 1979 | 0.6 | 1980 | 0.8 | 1981 | 0.8 | 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.8 | 1985 | 0.8 | 1986 | 0.8 |
| 1976 | 0.3 | 1977 | 0.3 | 1978 | 0.6 | 1979 | 0.6 | 1980 | 0.8 | 1981 | 0.8 | 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.8 | 1985 | 0.8 | 1986 | 0.8 | 1987 | 0.8 |
| 1977 | 0.3 | 1978 | 0.6 | 1979 | 0.6 | 1980 | 0.8 | 1981 | 0.8 | 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.8 | 1985 | 0.8 | 1986 | 0.8 | 1987 | 0.8 | 1988 | 0.8 |
| 1978 | 0.6 | 1979 | 0.6 | 1980 | 0.8 | 1981 | 0.8 | 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.8 | 1985 | 0.8 | 1986 | 0.8 | 1987 | 0.8 | 1988 | 0.8 | 1989 | 0.8 |
| 1979 | 0.6 | 1980 | 0.8 | 1981 | 0.8 | 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.8 | 1985 | 0.8 | 1986 | 0.8 | 1987 | 0.8 | 1988 | 0.8 | 1989 | 0.8 | 1990 | 0.8 |
| 1980 | 0.8 | 1981 | 0.8 | 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.8 | 1985 | 0.8 | 1986 | 0.8 | 1987 | 0.8 | 1988 | 0.8 | 1989 | 0.8 | 1990 | 0.8 | 1991 | 0.8 |
| 1981 | 0.8 | 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.8 | 1985 | 0.8 | 1986 | 0.8 | 1987 | 0.8 | 1988 | 0.8 | 1989 | 0.8 | 1990 | 0.8 | 1991 | 0.8 | 1992 | 0.8 |
| 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.8 | 1985 | 0.8 | 1986 | 0.8 | 1987 | 0.8 | 1988 | 0.8 | 1989 | 0.8 | 1990 | 0.8 | 1991 | 0.8 | 1992 | 0.8 | 1993 | 0.8 |
| 1983 | 0.8 | 1984 | 0.8 | 1985 | 0.8 | 1986 | 0.8 | 1987 | 0.8 | 1988 | 0.8 | 1989 | 0.8 | 1990 | 0.8 | 1991 | 0.8 | 1992 | 0.8 | 1993 | 0.8 | 1994 | 0.8 |
| 1984 | 0.8 | 1985 | 0.8 | 1986 | 0.8 | 1987 | 0.8 | 1988 | 0.8 | 1989 | 0.8 | 1990 | 0.8 | 1991 | 0.8 | 1992 | 0.8 | 1993 | 0.8 | 1994 | 0.8 | 1995 | 0.8 |
| 1985 | 0.8 | 1986 | 0.8 | 1987 | 0.8 | 1988 | 0.8 | 1989 | 0.8 | 1990 | 0.8 | 1991 | 0.8 | 1992 | 0.8 | 1993 | 0.8 | 1994 | 0.8 | 1995 | 0.8 | 1996 | 0.8 |
| 1986 | 0.8 | 1987 | 0.8 | 1988 | 0.8 | 1989 | 0.8 | 1990 | 0.8 | 1991 | 0.8 | 1992 | 0.8 | 1993 | 0.8 | 1994 | 0.8 | 1995 | 0.8 | 1996 | 0.8 | 1997 | 0.8 |
| 1987 | 0.8 | 1988 | 0.8 | 1989 | 0.8 | 1990 | 0.8 | 1991 | 0.8 | 1992 | 0.8 | 1993 | 0.8 | 1994 | 0.8 | 1995 | 0.8 | 1996 | 0.8 | 1997 | 0.8 | 1998 | 0.8 |
| 1988 | 0.8 | 1989 | 0.8 | 1990 | 0.8 | 1991 | 0.8 | 1992 | 0.8 | 1993 | 0.8 | 1994 | 0.8 | 1995 | 0.8 | 1996 | 0.8 | 1997 | 0.8 | 1998 | 0.8 | 1999 | 0.8 |
| 1989 | 0.8 | 1990 | 0.8 | 1991 | 0.8 | 1992 | 0.8 | 1993 | 0.8 | 1994 | 0.8 | 1995 | 0.8 | 1996 | 0.8 | 1997 | 0.8 | 1998 | 0.8 | 1999 | 0.8 | 2000 | 0.8 |
| 1990 | 0.8 | 1991 | 0.8 | 1992 | 0.8 | 1993 | 0.8 | 1994 | 0.8 | 1995 | 0.8 | 1996 | 0.8 | 1997 | 0.8 | 1998 | 0.8 | 1999 | 0.8 | 2000 | 0.8 | 2001 | 0.8 |
| 1991 | 0.8 | 1992 | 0.8 | 1993 | 0.8 | 1994 | 0.8 | 1995 | 0.8 | 1996 | 0.8 | 1997 | 0.8 | 1998 | 0.8 | 1999 | 0.8 | 2000 | 0.8 | 2001 | 0.8 | 2002 | 0.8 |
| 1992 | 0.8 | 1993 | 0.8 | 1994 | 0.8 | 1995 | 0.8 | 1996 | 0.8 | 1997 | 0.8 | 1998 | 0.8 | 1999 | 0.8 | 2000 | 0.8 | 2001 | 0.8 | 2002 | 0.8 | 2003 | 0.8 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 1.8.4.

# TABLE 1.8.3

# IDLE EMISSION RATES FOR LOW ALTITUDE MOTORCYCLES

* IER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Min.) | Deterioration Rate (Gm/Min/10K Mi) |
|---|---|---|---|
| HC | Pre-1978 | 1.95 | 0.42 |
| | 1978-1979 | 0.74 | 0.36 |
| | 1980+ | 0.59 | 0.38 |
| CO | Pre-1978 | 4.33 | 0.23 |
| | 1978-1979 | 2.92 | 0.50 |
| | 1980+ | 2.34 | 0.26 |
| NOx | Pre-1978 | 0.01 | 0.0 |
| | 1978-1979 | 0.03 | 0.0 |
| | 1980+ | 0.04 | 0.0 |

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

DATE : MAY 25, 1985

## TABLE 1.8.4

## REGISTRATION MIX AND MILEAGE ACCUMULATION RATES FOR LOW ALTITUDE MOTORCYCLES

| Model Year Index** | July 1 Registration Mix* | Mileage Accumulation Rate per vehicle* | Jan 1 Registration Mix | Jan 1 Mileage Accumulation Rate (fleet) | Jan 1 Mileage Accumulation (fleet) |
|---|---|---|---|---|---|
| 1 | 0.133 | 4100. | 0.044 | 0. | 0. |
| 2 | 0.145 | 2800. | 0.145 | 4100. | 2050. |
| 3 | 0.138 | 2100. | 0.138 | 2800. | 5500. |
| 4 | 0.116 | 1600. | 0.116 | 2100. | 7950. |
| 5 | 0.123 | 1200. | 0.123 | 1600. | 9800. |
| 6 | 0.114 | 800. | 0.114 | 1200. | 11200. |
| 7 | 0.069 | 600. | 0.069 | 800. | 12200. |
| 8 | 0.044 | 400. | 0.044 | 600. | 12900. |
| 9 | 0.024 | 200. | 0.024 | 400. | 13400. |
| 10 | 0.009 | 200. | 0.009 | 200. | 13700. |
| 11 | 0.085 | 200. | 0.085 | 200. | 13900. |
| 12 | 0.0 | 0. | 0.0 | 200. | 14100. |
| 13 | 0.0 | 0. | 0.0 | 0. | 14200. |
| 14 | 0.0 | 0. | 0.0 | 0. | 14200. |
| 15 | 0.0 | 0. | 0.0 | 0. | 14200. |
| 16 | 0.0 | 0. | 0.0 | 0. | 14200. |
| 17 | 0.0 | 0. | 0.0 | 0. | 14200. |
| 18 | 0.0 | 0. | 0.0 | 0. | 14200. |
| 19 | 0.0 | 0. | 0.0 | 0. | 14200. |
| 20+ | 0.0 | 0. | 0.0 | 0. | 14200. |

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

DATE : MAY 25, 1985

### TABLE 1.8.5

### EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR
### LOW ALTITUDE
### MOTORCYCLES
### JANUARY 1, 1988

| Model Years | (A) MC Fleet Registration | (B) Sales Fraction | (A*B) | (C=A*B/DAF) MC Registration | (D) Annual Mileage Accrual Rate | (C*D) | (C*D/TFNORM) Travel Fractions |
|---|---|---|---|---|---|---|---|
| 1988 | 0.044 | 1.000 | 0.044 | 0.0 | 0. | 0.0 | 0.0 |
| 1987 | 0.145 | 1.000 | 0.145 | 0.167 | 4100. | 685.7 | 0.356 |
| 1986 | 0.138 | 1.000 | 0.138 | 0.159 | 2800. | 445.7 | 0.232 |
| 1985 | 0.116 | 1.000 | 0.116 | 0.134 | 2100. | 281.0 | 0.146 |
| 1984 | 0.123 | 1.000 | 0.123 | 0.142 | 1600. | 227.0 | 0.118 |
| 1983 | 0.114 | 1.000 | 0.114 | 0.131 | 1200. | 157.8 | 0.082 |
| 1982 | 0.069 | 1.000 | 0.069 | 0.080 | 800. | 63.7 | 0.033 |
| 1981 | 0.044 | 1.000 | 0.044 | 0.051 | 600. | 30.4 | 0.016 |
| 1980 | 0.024 | 1.000 | 0.024 | 0.028 | 400. | 11.1 | 0.006 |
| 1979 | 0.009 | 1.000 | 0.009 | 0.010 | 200. | 2.1 | 0.001 |
| 1978 | 0.085 | 1.000 | 0.085 | 0.098 | 200. | 19.6 | 0.010 |
| 1977 | 0.0 | 1.000 | 0.0 | 0.0 | 200. | 0.0 | 0.0 |
| 1976 | 0.0 | 1.000 | 0.0 | 0.0 | 0. | 0.0 | 0.0 |
| 1975 | 0.0 | 1.000 | 0.0 | 0.0 | 0. | 0.0 | 0.0 |
| 1974 | 0.0 | 1.000 | 0.0 | 0.0 | 0. | 0.0 | 0.0 |
| 1973 | 0.0 | 1.000 | 0.0 | 0.0 | 0. | 0.0 | 0.0 |
| 1972 | 0.0 | 1.000 | 0.0 | 0.0 | 0. | 0.0 | 0.0 |
| 1971 | 0.0 | 1.000 | 0.0 | 0.0 | 0. | 0.0 | 0.0 |
| 1970 | 0.0 | 1.000 | 0.0 | 0.0 | 0. | 0.0 | 0.0 |
| 1969- | 0.0 | 1.000 | 0.0 | 0.0 | 0. | 0.0 | 0.0 |
| | | DAF: | 0.911 | | TFNORM: | 1924.0 | |

WHERE :

A = January 1 registration mix from Table 1.8.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 1.8.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI)= .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

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## TABLE 1.8.6

## SPEED CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE MOTORCYCLES

$$\bullet\ SCF(s, sadj) = SF(s)/SF(sadj)$$

$$SF(s) = EXP(A + B*s + C*s^2 + D*S^3 + E*s^4 + F*s^5),\ HC\ \&\ CO$$
$$= A + B*s + C*s^2 + D*s^3 + E*s^4 + F*s^5\ ,\ NO_x$$

| Pollutant and Model Years | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| HC | | | | | | |
| Pre-1978 | 0.231026E+01 | -0.289572E+00 | 0.152990E-01 | -0.446689E-03 | 0.648183E-05 | -0.363456E-07 |
| 1978-1979 | 0.240873E+01 | -0.308187E+00 | 0.168168E-01 | -0.506843E-03 | 0.753855E-05 | -0.431596E-07 |
| 1980+ | 0.225223E+01 | -0.287778E+00 | 0.156820E-01 | -0.473179E-03 | 0.707954E-05 | -0.408456E-07 |
| CO | | | | | | |
| Pre-1978 | 0.233989E+01 | -0.296978E+00 | 0.160071E-01 | -0.477396E-03 | 0.706752E-05 | -0.403978E-07 |
| 1978-1979 | 0.277804E+01 | -0.319130E+00 | 0.153183E-01 | -0.422327E-03 | 0.584948E-05 | -0.314969E-07 |
| 1980+ | 0.270743E+01 | -0.331038E+00 | 0.176179E-01 | -0.538583E-03 | 0.817402E-05 | -0.477803E-07 |
| NOx | | | | | | |
| Pre-1978 | 0.168635E+01 | -0.118303E+00 | 0.654975E-02 | -0.137139E-03 | 0.100849E-05 | 0.0 |
| 1978+ | 0.128169E+01 | -0.804874E-01 | 0.535735E-02 | -0.118891E-03 | 0.901060E-06 | 0.0 |

• WHERE : s = average speed (mph)
sadj = basic test procedure speed; adjusted for fraction of cold start operation x and fraction of hot start operation w, [ 1/sadj = (w+x)/26 + (1-w-x)/16 ]

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## TABLE 1.8.7A

## TEMPERATURE CORRECTION FACTOR COEFFICIENTS FOR LOW ALTITUDE MOTORCYCLES

* TCF(b) = EXP( TC(b) * (T - 75.0))

| Pol | Model Years | Test segment 1 |  | Test segment 2 |  | Test segment 3 |  |
|---|---|---|---|---|---|---|---|
|  |  | TC Low | TC High | TC Low | TC High | TC Low | TC High |
| HC | Pre-1978 | -0.20623E-01 | -0.14381E-01 | -0.24032E-02 | 0.13219E-02 | -0.10081E-02 | 0.34799E-02 |
|  | 1978-1979 | -0.24462E-01 | -0.12552E-01 | -0.32017E-02 | 0.42667E-02 | -0.86884E-03 | 0.75843E-02 |
|  | 1980+ | -0.21255E-01 | -0.10888E-01 | -0.52755E-03 | -0.47925E-03 | 0.93659E-03 | 0.76666E-02 |
| CO | Pre-1978 | -0.13487E-01 | -0.14691E-01 | 0.15784E-02 | 0.37462E-02 | 0.11097E-02 | 0.11014E-01 |
|  | 1978-1979 | -0.21126E-01 | -0.38767E-01 | -0.15289E-02 | 0.84685E-02 | 0.15749E-02 | 0.25179E-01 |
|  | 1980+ | -0.20843E-01 | -0.21165E-01 | -0.59951E-02 | 0.23603E-01 | 0.18253E-02 | 0.28483E-01 |
| NOx | Pre-1978 | -0.16897E-03 | 0.38841E-02 | -0.89245E-02 | -0.87325E-02 | -0.72580E-02 | -0.10839E-01 |
|  | 1978+ | -0.25074E-03 | -0.10389E-02 | -0.59791E-02 | -0.92466E-02 | -0.62690E-02 | -0.10108E-01 |

* WHERE :

TCF(b) = Temperature correction factor for appropriate pollutant, ambient temperature, and model year; for test segment b
T = Ambient temperature (Fahrenheit)
TC(b) = Temperature correction factor coefficient for appropriate pollutant, reference temperature and model year; for test segment b
75.0 = Reference temperature

NOTE : The temperature correction factor is used in conjunction with the Ripstwxn correction factor given in Table 1.8.7B.

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# TABLE 1.8.7B

## NORMALIZED BAG FRACTIONS FOR LOW ALTITUDE MOTORCYCLES

| | | Normalized Fractions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Model | Test Seg.#1 | | Test Seg.#2 | | Test Seg.#3 | | Total Test | |
| Pol | Years | B1 | D1 | B2 | D2 | B3 | D3 | B0 | D0 |
| HC | Pre-1978 | 1.282 | 0.025 | 0.973 | 0.028 | 0.839 | 0.019 | 1.000 | 0.025 |
| | 1978-1979 | 1.345 | 0.074 | 0.946 | 0.054 | 0.842 | 0.048 | 1.000 | 0.056 |
| | 1980+ | 1.345 | 0.178 | 0.919 | 0.118 | 0.894 | 0.093 | 1.000 | 0.124 |
| CO | Pre-1978 | 1.277 | 0.033 | 1.017 | 0.029 | 0.758 | 0.025 | 1.000 | 0.029 |
| | 1978-1979 | 1.442 | 0.071 | 0.996 | 0.042 | 0.674 | 0.033 | 1.000 | 0.046 |
| | 1980+ | 1.553 | 0.109 | 0.933 | 0.079 | 0.711 | 0.038 | 1.000 | 0.074 |
| NOx | Pre-1978 | 1.121 | 0.009 | 0.785 | 0.001 | 1.319 | -0.009 | 1.000 | 0.0 |
| | 1978+ | 1.199 | -0.004 | 0.793 | -0.002 | 1.245 | 0.006 | 1.000 | 0.0 |

NOTE : The fractions given in this table are used in the calculation of the operating-mode/ temperature correction factor (OMTCF).

WHERE :
OMTCF = ((TERM1 + TERM2 + TERM3)/DENOM)
TERM1 = W *TCF(1)*(B1+D1*M)
TERM2 = (1-W-X)*TCF(2)*(B2+D2*M)
TERM3 = X *TCF(3)*(B3+D3*M)
DENOM = B0 + D0*M
W = Fraction of VMT in the cold start mode
X = Fraction of VMT in the hot start mode
TCF(b) = Temperature correction factor for pollutant, model year; for test segment b
M = Cumulative mileage / 10,000

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## TABLE 2.1.1A

## EXHAUST EMISSION RATES FOR
## HIGH ALTITUDE
## LIGHT DUTY GASOLINE POWERED VEHICLES
## (RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Mile) | Deterioration Rate (Gm/Mi/10K Mi) | 50,000 Mile Emission Level (Grams/Mile) |
|---|---|---|---|---|
| HC | Pre-1968 | 9.35 | 0.18 | 10.25 |
| | 1968-1969 | 5.60 | 0.25 | 6.85 |
| | 1970-1971 | 4.58 | 0.37 | 6.43 |
| | 1972-1974 | 4.58 | 0.17 | 5.43 |
| | 1975-1976 | 2.02 | 0.27 | 3.37 |
| | 1977 | 0.95 | 0.27 | 2.30 |
| | 1978-1979 | 2.10 | 0.27 | 3.45 |
| | 1980 | 0.78 | 0.10 | 1.28 |
| | 1981 | 0.54 | 0.14 | 1.24 |
| | 1982 | 0.37 | 0.14 | 1.07 |
| | 1983 | 0.36 | 0.14 | 1.06 |
| | 1984 | 0.29 | 0.15 | 1.04 |
| | 1985-1989 | 0.29 | 0.14 | 0.99 |
| | 1990+ | 0.29 | 0.13 | 0.94 |
| CO | Pre-1968 | 117.70 | 2.25 | 128.95 |
| | 1968-1969 | 85.54 | 2.55 | 98.29 |
| | 1970-1971 | 79.64 | 3.13 | 95.29 |
| | 1972-1974 | 75.63 | 2.44 | 87.83 |
| | 1975-1976 | 43.07 | 2.59 | 56.02 |
| | 1977 | 16.97 | 2.59 | 29.92 |
| | 1978-1979 | 39.78 | 2.59 | 52.73 |
| | 1980 | 22.80 | 0.73 | 26.45 |
| | 1981 | 11.43 | 3.26 | 27.73 |
| | 1982 | 7.18 | 3.29 | 23.63 |
| | 1983 | 5.01 | 3.33 | 21.66 |
| | 1984 | 3.18 | 3.55 | 20.93 |
| | 1985-1986 | 3.16 | 3.35 | 19.91 |
| | 1987-1989 | 3.02 | 3.13 | 18.67 |
| | 1990+ | 3.03 | 3.05 | 18.28 |
| NOx | Pre-1968 | 1.96 | 0.0 | 1.96 |
| | 1968-1972 | 2.91 | 0.0 | 2.91 |
| | 1973-1974 | 1.91 | 0.04 | 2.11 |
| | 1975-1976 | 1.70 | 0.03 | 1.85 |
| | 1977 | 1.42 | 0.09 | 1.87 |
| | 1978-1979 | 1.00 | 0.09 | 1.45 |
| | 1980 | 0.82 | 0.07 | 1.17 |
| | 1981 | 0.46 | 0.08 | 0.86 |
| | 1982 | 0.60 | 0.08 | 1.00 |
| | 1983 | 0.56 | 0.08 | 0.96 |
| | 1984 | 0.54 | 0.09 | 0.99 |
| | 1985-1986 | 0.54 | 0.09 | 0.99 |
| | 1987-1989 | 0.54 | 0.10 | 1.04 |
| | 1990+ | 0.54 | 0.10 | 1.04 |

* WHERE : BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

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## TABLE 2.1.1B

### EXHAUST EMISSION RATES FOR
### HIGH ALTITUDE
### LIGHT DUTY GASOLINE POWERED VEHICLES
### AT VARIOUS MILEAGE INTERVALS
### (RATES INCLUDE TAMPERING)

| Pol | Model Years | Emission Rate (Grams/Mile) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 0K | 20K | 40K | 60K | 80K | 100K | 120K | 140K |
| HC | Pre-1968 | 9.35 | 9.71 | 10.07 | 10.43 | 10.79 | 11.14 | 11.50 | 11.86 |
| | 1968-1969 | 5.60 | 6.11 | 6.61 | 7.12 | 7.63 | 8.14 | 8.65 | 9.16 |
| | 1970-1971 | 4.58 | 5.32 | 6.06 | 6.80 | 7.54 | 8.28 | 9.02 | 9.76 |
| | 1972 | 4.58 | 4.92 | 5.27 | 5.61 | 5.96 | 6.31 | 6.65 | 7.00 |
| | 1973-1974 | 4.58 | 4.93 | 5.29 | 5.65 | 6.01 | 6.37 | 6.73 | 7.09 |
| | 1975 | 2.05 | 2.69 | 3.38 | 4.08 | 4.77 | 5.47 | 6.16 | 6.86 |
| | 1976 | 2.05 | 2.70 | 3.39 | 4.09 | 4.79 | 5.49 | 6.19 | 6.89 |
| | 1977 | 0.98 | 1.62 | 2.32 | 3.01 | 3.71 | 4.41 | 5.10 | 5.80 |
| | 1978-1979 | 2.14 | 2.78 | 3.48 | 4.18 | 4.89 | 5.59 | 6.29 | 6.99 |
| | 1980 | 0.82 | 1.13 | 1.51 | 1.89 | 2.27 | 2.64 | 3.02 | 3.40 |
| | 1981 | 0.57 | 0.93 | 1.33 | 1.73 | 2.13 | 2.53 | 2.93 | 3.33 |
| | 1982 | 0.40 | 0.76 | 1.15 | 1.55 | 1.95 | 2.35 | 2.75 | 3.15 |
| | 1983 | 0.39 | 0.74 | 1.14 | 1.54 | 1.93 | 2.33 | 2.73 | 3.12 |
| | 1984 | 0.32 | 0.69 | 1.09 | 1.50 | 1.90 | 2.31 | 2.71 | 3.12 |
| | 1985-1986 | 0.32 | 0.66 | 1.05 | 1.43 | 1.81 | 2.19 | 2.58 | 2.96 |
| | 1987-1989 | 0.32 | 0.66 | 1.04 | 1.43 | 1.81 | 2.19 | 2.57 | 2.95 |
| | 1990+ | 0.32 | 0.64 | 1.00 | 1.36 | 1.73 | 2.09 | 2.45 | 2.81 |
| CO | Pre-1968 | 117.68 | 122.12 | 126.56 | 131.00 | 135.45 | 139.89 | 144.34 | 148.79 |
| | 1968-1969 | 85.54 | 90.60 | 95.70 | 100.81 | 105.92 | 111.03 | 116.15 | 121.27 |
| | 1970-1971 | 79.65 | 85.95 | 92.29 | 98.62 | 104.96 | 111.30 | 117.64 | 123.98 |
| | 1972 | 75.64 | 80.62 | 85.69 | 90.76 | 95.83 | 100.89 | 105.95 | 111.02 |
| | 1973-1974 | 75.64 | 80.78 | 86.18 | 91.57 | 96.96 | 102.35 | 107.74 | 113.12 |
| | 1975 | 43.35 | 49.54 | 56.41 | 63.28 | 70.15 | 77.02 | 83.89 | 90.76 |
| | 1976 | 43.37 | 49.56 | 56.43 | 63.29 | 70.15 | 77.01 | 83.88 | 90.74 |
| | 1977 | 17.27 | 23.41 | 30.19 | 36.96 | 43.73 | 50.50 | 57.28 | 64.05 |
| | 1978-1979 | 40.10 | 46.27 | 53.08 | 59.89 | 66.70 | 73.51 | 80.32 | 87.13 |
| | 1980 | 23.18 | 25.78 | 29.14 | 32.51 | 35.89 | 39.26 | 42.63 | 46.01 |
| | 1981 | 11.64 | 18.99 | 26.92 | 34.86 | 42.79 | 50.72 | 58.66 | 66.59 |
| | 1982 | 7.39 | 14.75 | 22.67 | 30.58 | 38.49 | 46.40 | 54.31 | 62.22 |
| | 1983 | 5.22 | 12.63 | 20.57 | 28.50 | 36.44 | 44.37 | 52.31 | 60.24 |
| | 1984 | 3.37 | 11.15 | 19.42 | 27.69 | 35.96 | 44.22 | 52.49 | 60.76 |
| | 1985-1986 | 3.35 | 10.68 | 18.46 | 26.23 | 34.00 | 41.77 | 49.54 | 57.31 |
| | 1987-1989 | 3.21 | 10.08 | 17.37 | 24.65 | 31.94 | 39.23 | 46.51 | 53.80 |
| | 1990+ | 3.22 | 9.93 | 17.05 | 24.18 | 31.30 | 38.42 | 45.55 | 52.67 |
| NOx | Pre-1968 | 1.96 | 1.96 | 1.96 | 1.96 | 1.96 | 1.96 | 1.96 | 1.96 |
| | 1968-1972 | 2.91 | 2.91 | 2.91 | 2.91 | 2.90 | 2.90 | 2.90 | 2.90 |
| | 1973 | 1.91 | 2.03 | 2.15 | 2.28 | 2.40 | 2.52 | 2.64 | 2.77 |
| | 1974 | 1.91 | 2.04 | 2.17 | 2.29 | 2.42 | 2.55 | 2.68 | 2.80 |
| | 1975-1976 | 1.70 | 1.89 | 2.08 | 2.27 | 2.46 | 2.65 | 2.84 | 3.03 |
| | 1977 | 1.42 | 1.74 | 2.06 | 2.37 | 2.69 | 3.01 | 3.33 | 3.65 |
| | 1978-1979 | 1.00 | 1.32 | 1.64 | 1.95 | 2.27 | 2.59 | 2.91 | 3.23 |
| | 1980 | 0.82 | 1.11 | 1.39 | 1.68 | 1.97 | 2.26 | 2.55 | 2.84 |
| | 1981 | 0.47 | 0.72 | 1.00 | 1.28 | 1.56 | 1.84 | 2.12 | 2.40 |
| | 1982 | 0.61 | 0.86 | 1.14 | 1.42 | 1.70 | 1.98 | 2.26 | 2.54 |
| | 1983 | 0.57 | 0.82 | 1.10 | 1.38 | 1.66 | 1.94 | 2.22 | 2.50 |
| | 1984 | 0.55 | 0.83 | 1.15 | 1.47 | 1.79 | 2.11 | 2.43 | 2.75 |
| | 1985-1986 | 0.55 | 0.83 | 1.15 | 1.47 | 1.79 | 2.11 | 2.43 | 2.75 |
| | 1987-1989 | 0.55 | 0.85 | 1.19 | 1.53 | 1.87 | 2.21 | 2.54 | 2.88 |
| | 1990+ | 0.55 | 0.85 | 1.19 | 1.53 | 1.87 | 2.21 | 2.54 | 2.88 |

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## TABLE 2.1.1C

## CRANKCASE AND EVAPORATIVE HYDROCARBON EMISSIONS
## FOR HIGH ALTITUDE
## LIGHT DUTY GASOLINE POWERED VEHICLES
## (RATES REFLECT ZERO TAMPERING)

** CCEV = (HSK * TPD + DNL)/MPD + CC

| Model Years | SHED Hot Soak Emissions (Gm/Trip) | Trips* Per Day | SHED Diurnal Emissions (Gm/Day) | Miles* Per Day | Crankcase Emissions (Gm/Mile) | Total Crankcase and Evap. Emissions (Gm/Mile) |
|---|---|---|---|---|---|---|
| Pre-1963 | 29.18 | 3.05 | 62.38 | 31.10 | 5.29 | 10.16 |
| 1963-1967 | 29.18 | 3.05 | 62.38 | 31.10 | 1.03 | 5.90 |
| 1968-1970 | 29.18 | 3.05 | 62.38 | 31.10 | 0.0 | 4.87 |
| 1971 | 20.99 | 3.05 | 50.15 | 31.10 | 0.0 | 3.67 |
| 1972-1976 | 20.96 | 3.05 | 44.93 | 31.10 | 0.0 | 3.50 |
| 1977 | 12.32 | 3.05 | 22.53 | 31.10 | 0.0 | 1.93 |
| 1978-1980 | 10.31 | 3.05 | 24.11 | 31.10 | 0.0 | 1.79 |
| 1981 | 9.71 | 3.05 | 24.11 | 31.10 | 0.0 | 1.73 |
| 1982 | 4.60 | 3.05 | 12.10 | 31.10 | 0.0 | 0.84 |
| 1983 | 4.30 | 3.05 | 12.10 | 31.10 | 0.0 | 0.81 |
| 1984 | 3.01 | 3.05 | 9.31 | 31.10 | 0.0 | 0.59 |
| 1985-1986 | 2.50 | 3.05 | 9.31 | 31.10 | 0.0 | 0.54 |
| 1987-1989 | 2.05 | 3.05 | 9.31 | 31.10 | 0.0 | 0.50 |
| 1990+ | 1.82 | 3.05 | 9.31 | 31.10 | 0.0 | 0.48 |

* Default information that may be altered by the MOBILE3 user with information about the local area.

** WHERE :

CCEV = Total untampered crankcase & evaporative HC emissions (Gm/Mile)
HSK = Hot soak emissions (Gm/Trip)
TPD = Trips per day
DNL = Diurnal emissions (Gm/Day)
MPD = Miles per day
CC = Crankcase emissions (Gm/Mile)

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## TABLE 2.1.1D

## TOTAL CRANKCASE AND EVAPORATIVE HC EMISSIONS FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED VEHICLES AT VARIOUS MILEAGE INTERVALS (RATES INCLUDE TAMPERING)

| Model Years | Emission Rate (Grams/Mile) 0K | 20K | 40K | 60K | 80K | 100K | 120K | 140K |
|---|---|---|---|---|---|---|---|---|
| Pre-1963 | 10.16 | 10.16 | 10.16 | 10.16 | 10.16 | 10.16 | 10.16 | 10.16 |
| 1963-1967 | 5.90 | 5.90 | 5.90 | 5.90 | 5.90 | 5.90 | 5.90 | 5.90 |
| 1968-1970 | 4.87 | 4.89 | 4.91 | 4.92 | 4.94 | 4.96 | 4.98 | 5.00 |
| 1971 | 3.67 | 3.69 | 3.72 | 3.74 | 3.77 | 3.79 | 3.82 | 3.84 |
| 1972-1974 | 3.50 | 3.52 | 3.55 | 3.59 | 3.62 | 3.65 | 3.68 | 3.72 |
| 1975-1976 | 3.50 | 3.52 | 3.55 | 3.59 | 3.62 | 3.65 | 3.68 | 3.71 |
| 1977 | 1.93 | 1.95 | 1.99 | 2.02 | 2.05 | 2.08 | 2.11 | 2.15 |
| 1978-1979 | 1.79 | 1.81 | 1.83 | 1.86 | 1.89 | 1.91 | 1.94 | 1.97 |
| 1980 | 1.79 | 1.80 | 1.83 | 1.85 | 1.88 | 1.90 | 1.93 | 1.95 |
| 1981 | 1.73 | 1.74 | 1.77 | 1.79 | 1.81 | 1.84 | 1.86 | 1.89 |
| 1982 | 0.84 | 0.86 | 0.88 | 0.90 | 0.92 | 0.95 | 0.97 | 0.99 |
| 1983 | 0.81 | 0.83 | 0.85 | 0.87 | 0.89 | 0.91 | 0.93 | 0.95 |
| 1984 | 0.60 | 0.61 | 0.63 | 0.65 | 0.67 | 0.69 | 0.71 | 0.73 |
| 1985-1986 | 0.55 | 0.56 | 0.58 | 0.60 | 0.61 | 0.63 | 0.65 | 0.67 |
| 1987-1989 | 0.50 | 0.51 | 0.53 | 0.55 | 0.56 | 0.58 | 0.60 | 0.61 |
| 1990+ | 0.48 | 0.49 | 0.51 | 0.52 | 0.54 | 0.55 | 0.57 | 0.59 |

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TABLE 2.1.2A

DATE : MAY 25, 1985

# EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
# LIGHT DUTY GASOLINE POWERED VEHICLES
# TOTAL HC (INCLUDES EVAP & CRANKCASE)

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 22.3 | 1962 | 22.3 | 1963 | 18.0 | 1964 | 18.0 | 1965 | 18.0 | 1966 | 18.0 | 1967 | 18.0 | 1968 | 14.4 | 1969 | 14.4 | 1970 | 15.3 | 1971 | 14.1 | 1972 | 10.9 |
| 1962 | 22.2 | 1963 | 17.9 | 1964 | 17.9 | 1965 | 17.9 | 1966 | 17.9 | 1967 | 17.9 | 1968 | 14.3 | 1969 | 14.3 | 1970 | 15.1 | 1971 | 13.9 | 1972 | 10.8 | 1973 | 10.8 |
| 1963 | 17.8 | 1964 | 17.8 | 1965 | 17.8 | 1966 | 17.8 | 1967 | 17.8 | 1968 | 14.2 | 1969 | 14.2 | 1970 | 14.9 | 1971 | 13.7 | 1972 | 10.7 | 1973 | 10.7 | 1974 | 10.7 |
| 1964 | 17.8 | 1965 | 17.8 | 1966 | 17.8 | 1967 | 17.8 | 1968 | 14.1 | 1969 | 14.1 | 1970 | 14.7 | 1971 | 13.5 | 1972 | 10.6 | 1973 | 10.6 | 1974 | 10.6 | 1975 | 9.4 |
| 1965 | 17.7 | 1966 | 17.7 | 1967 | 17.7 | 1968 | 13.9 | 1969 | 13.9 | 1970 | 14.5 | 1971 | 13.3 | 1972 | 10.5 | 1973 | 10.5 | 1974 | 10.5 | 1975 | 9.3 | 1976 | 9.3 |
| 1966 | 17.5 | 1967 | 17.5 | 1968 | 13.8 | 1969 | 13.8 | 1970 | 14.3 | 1971 | 13.1 | 1972 | 10.4 | 1973 | 10.4 | 1974 | 10.4 | 1975 | 9.1 | 1976 | 9.1 | 1977 | 6.5 |
| 1967 | 17.4 | 1968 | 13.6 | 1969 | 13.6 | 1970 | 14.1 | 1971 | 12.9 | 1972 | 10.3 | 1973 | 10.3 | 1974 | 10.3 | 1975 | 9.0 | 1976 | 9.0 | 1977 | 6.3 | 1978 | 7.3 |
| 1968 | 13.5 | 1969 | 13.5 | 1970 | 13.8 | 1971 | 12.6 | 1972 | 10.2 | 1973 | 10.2 | 1974 | 10.2 | 1975 | 8.8 | 1976 | 8.8 | 1977 | 6.1 | 1978 | 7.1 | 1979 | 7.1 |
| 1969 | 13.3 | 1970 | 13.6 | 1971 | 12.4 | 1972 | 10.1 | 1973 | 10.1 | 1974 | 10.1 | 1975 | 8.6 | 1976 | 8.6 | 1977 | 5.9 | 1978 | 6.9 | 1979 | 6.9 | 1980 | 3.8 |
| 1970 | 13.3 | 1971 | 12.1 | 1972 | 10.0 | 1973 | 10.0 | 1974 | 10.0 | 1975 | 8.4 | 1976 | 8.4 | 1977 | 5.7 | 1978 | 6.7 | 1979 | 6.7 | 1980 | 3.7 | 1981 | 3.8 |
| 1971 | 11.8 | 1972 | 9.9 | 1973 | 9.9 | 1974 | 9.9 | 1975 | 8.2 | 1976 | 8.2 | 1977 | 5.5 | 1978 | 6.5 | 1979 | 6.5 | 1980 | 3.6 | 1981 | 3.7 | 1982 | 2.6 |
| 1972 | 9.7 | 1973 | 9.7 | 1974 | 9.7 | 1975 | 8.0 | 1976 | 8.0 | 1977 | 5.3 | 1978 | 6.3 | 1979 | 6.3 | 1980 | 3.6 | 1981 | 3.6 | 1982 | 2.5 | 1983 | 2.4 |
| 1973 | 9.6 | 1974 | 9.6 | 1975 | 7.7 | 1976 | 7.7 | 1977 | 5.1 | 1978 | 6.1 | 1979 | 6.1 | 1980 | 3.5 | 1981 | 3.5 | 1982 | 2.4 | 1983 | 2.3 | 1984 | 2.1 |
| 1974 | 9.4 | 1975 | 7.5 | 1976 | 7.5 | 1977 | 4.8 | 1978 | 5.8 | 1979 | 5.8 | 1980 | 3.4 | 1981 | 3.3 | 1982 | 2.2 | 1983 | 2.2 | 1984 | 2.0 | 1985 | 1.8 |
| 1975 | 7.2 | 1976 | 7.2 | 1977 | 4.6 | 1978 | 5.6 | 1979 | 5.6 | 1980 | 3.3 | 1981 | 3.2 | 1982 | 2.1 | 1983 | 2.1 | 1984 | 1.8 | 1985 | 1.7 | 1986 | 1.7 |
| 1976 | 6.9 | 1977 | 4.3 | 1978 | 5.3 | 1979 | 5.3 | 1980 | 3.2 | 1981 | 3.1 | 1982 | 2.0 | 1983 | 1.9 | 1984 | 1.6 | 1985 | 1.5 | 1986 | 1.5 | 1987 | 1.5 |
| 1977 | 4.0 | 1978 | 5.0 | 1979 | 5.0 | 1980 | 3.1 | 1981 | 2.9 | 1982 | 1.8 | 1983 | 1.8 | 1984 | 1.5 | 1985 | 1.4 | 1986 | 1.4 | 1987 | 1.3 | 1988 | 1.3 |
| 1978 | 4.7 | 1979 | 4.7 | 1980 | 3.0 | 1981 | 2.7 | 1982 | 1.6 | 1983 | 1.6 | 1984 | 1.3 | 1985 | 1.2 | 1986 | 1.2 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 |
| 1979 | 4.3 | 1980 | 2.8 | 1981 | 2.6 | 1982 | 1.5 | 1983 | 1.4 | 1984 | 1.1 | 1985 | 1.1 | 1986 | 1.1 | 1987 | 1.0 | 1988 | 1.0 | 1989 | 1.0 | 1990 | 1.0 |
| 1980 | 2.8 | 1981 | 2.5 | 1982 | 1.4 | 1983 | 1.3 | 1984 | 1.0 | 1985 | 0.9 | 1986 | 0.9 | 1987 | 0.9 | 1988 | 0.9 | 1989 | 0.9 | 1990 | 0.9 | 1991 | 0.9 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 10.9 | 1974 | 10.9 | 1975 | 9.8 | 1976 | 9.8 | 1977 | 7.2 | 1978 | 8.2 | 1979 | 8.2 | 1980 | 4.3 | 1981 | 4.6 | 1982 | 3.5 | 1983 | 3.4 | 1984 | 3.3 |
| 1974 | 10.8 | 1975 | 9.7 | 1976 | 9.7 | 1977 | 7.1 | 1978 | 8.1 | 1979 | 8.1 | 1980 | 4.2 | 1981 | 4.5 | 1982 | 3.4 | 1983 | 3.3 | 1984 | 3.2 | 1985 | 3.0 |
| 1975 | 9.6 | 1976 | 9.6 | 1977 | 6.9 | 1978 | 7.9 | 1979 | 7.9 | 1980 | 4.2 | 1981 | 4.4 | 1982 | 3.3 | 1983 | 3.3 | 1984 | 3.1 | 1985 | 2.9 | 1986 | 2.9 |
| 1976 | 9.4 | 1977 | 6.8 | 1978 | 7.8 | 1979 | 7.8 | 1980 | 4.1 | 1981 | 4.3 | 1982 | 3.3 | 1983 | 3.2 | 1984 | 3.0 | 1985 | 2.8 | 1986 | 2.8 | 1987 | 2.8 |
| 1977 | 6.6 | 1978 | 7.6 | 1979 | 7.6 | 1980 | 4.1 | 1981 | 4.3 | 1982 | 3.2 | 1983 | 3.1 | 1984 | 3.0 | 1985 | 2.8 | 1986 | 2.8 | 1987 | 2.7 | 1988 | 2.7 |
| 1978 | 7.5 | 1979 | 7.5 | 1980 | 4.0 | 1981 | 4.2 | 1982 | 3.1 | 1983 | 3.0 | 1984 | 2.9 | 1985 | 2.7 | 1986 | 2.7 | 1987 | 2.6 | 1988 | 2.6 | 1989 | 2.6 |
| 1979 | 7.3 | 1980 | 3.9 | 1981 | 4.1 | 1982 | 3.0 | 1983 | 3.0 | 1984 | 2.8 | 1985 | 2.6 | 1986 | 2.6 | 1987 | 2.5 | 1988 | 2.5 | 1989 | 2.5 | 1990 | 2.4 |
| 1980 | 3.9 | 1981 | 4.0 | 1982 | 2.9 | 1983 | 2.9 | 1984 | 2.7 | 1985 | 2.5 | 1986 | 2.5 | 1987 | 2.5 | 1988 | 2.5 | 1989 | 2.5 | 1990 | 2.3 | 1991 | 2.3 |
| 1981 | 3.9 | 1982 | 2.8 | 1983 | 2.8 | 1984 | 2.6 | 1985 | 2.4 | 1986 | 2.4 | 1987 | 2.4 | 1988 | 2.4 | 1989 | 2.4 | 1990 | 2.2 | 1991 | 2.2 | 1992 | 2.2 |
| 1982 | 2.7 | 1983 | 2.7 | 1984 | 2.5 | 1985 | 2.3 | 1986 | 2.3 | 1987 | 2.3 | 1988 | 2.3 | 1989 | 2.3 | 1990 | 2.1 | 1991 | 2.1 | 1992 | 2.1 | 1993 | 2.1 |
| 1983 | 2.6 | 1984 | 2.3 | 1985 | 2.2 | 1986 | 2.2 | 1987 | 2.1 | 1988 | 2.1 | 1989 | 2.1 | 1990 | 2.0 | 1991 | 2.0 | 1992 | 2.0 | 1993 | 2.0 | 1994 | 2.0 |
| 1984 | 2.2 | 1985 | 2.1 | 1986 | 2.1 | 1987 | 2.0 | 1988 | 2.0 | 1989 | 2.0 | 1990 | 1.9 | 1991 | 1.9 | 1992 | 1.9 | 1993 | 1.9 | 1994 | 1.9 | 1995 | 1.9 |
| 1985 | 2.0 | 1986 | 2.0 | 1987 | 1.9 | 1988 | 1.9 | 1989 | 1.9 | 1990 | 1.8 | 1991 | 1.8 | 1992 | 1.8 | 1993 | 1.8 | 1994 | 1.8 | 1995 | 1.8 | 1996 | 1.8 |
| 1986 | 1.8 | 1987 | 1.8 | 1988 | 1.8 | 1989 | 1.8 | 1990 | 1.7 | 1991 | 1.7 | 1992 | 1.7 | 1993 | 1.7 | 1994 | 1.7 | 1995 | 1.7 | 1996 | 1.7 | 1997 | 1.7 |
| 1987 | 1.6 | 1988 | 1.6 | 1989 | 1.6 | 1990 | 1.6 | 1991 | 1.6 | 1992 | 1.6 | 1993 | 1.6 | 1994 | 1.6 | 1995 | 1.6 | 1996 | 1.6 | 1997 | 1.6 | 1998 | 1.6 |
| 1988 | 1.5 | 1989 | 1.5 | 1990 | 1.4 | 1991 | 1.4 | 1992 | 1.4 | 1993 | 1.4 | 1994 | 1.4 | 1995 | 1.4 | 1996 | 1.4 | 1997 | 1.4 | 1998 | 1.4 | 1999 | 1.4 |
| 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 | 1993 | 1.3 | 1994 | 1.3 | 1995 | 1.3 | 1996 | 1.3 | 1997 | 1.3 | 1998 | 1.3 | 1999 | 1.3 | 2000 | 1.3 |
| 1990 | 1.1 | 1991 | 1.1 | 1992 | 1.1 | 1993 | 1.1 | 1994 | 1.1 | 1995 | 1.1 | 1996 | 1.1 | 1997 | 1.1 | 1998 | 1.1 | 1999 | 1.1 | 2000 | 1.1 | 2001 | 1.1 |
| 1991 | 1.0 | 1992 | 1.0 | 1993 | 1.0 | 1994 | 1.0 | 1995 | 1.0 | 1996 | 1.0 | 1997 | 1.0 | 1998 | 1.0 | 1999 | 1.0 | 2000 | 1.0 | 2001 | 1.0 | 2002 | 1.0 |
| 1992 | 0.9 | 1993 | 0.9 | 1994 | 0.9 | 1995 | 0.9 | 1996 | 0.9 | 1997 | 0.9 | 1998 | 0.9 | 1999 | 0.9 | 2000 | 0.9 | 2001 | 0.9 | 2002 | 0.9 | 2003 | 0.9 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.1.4.

TABLE 2.1.2B

DATE : MAY 25, 1985

## EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED VEHICLES
## CO

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 151.1 | 1962 | 151.1 | 1963 | 151.1 | 1964 | 151.1 | 1965 | 151.1 | 1966 | 151.1 | 1967 | 151.1 | 1968 | 123.6 | 1969 | 123.6 | 1970 | 126.5 | 1971 | 126.5 | 1972 | 112.1 |
| 1962 | 150.1 | 1963 | 150.1 | 1964 | 150.1 | 1965 | 150.1 | 1966 | 150.1 | 1967 | 150.1 | 1968 | 122.4 | 1969 | 122.4 | 1970 | 125.0 | 1971 | 125.0 | 1972 | 111.0 | 1973 | 111.0 |
| 1963 | 149.0 | 1964 | 149.0 | 1965 | 149.0 | 1966 | 149.0 | 1967 | 149.0 | 1968 | 121.2 | 1969 | 121.2 | 1970 | 123.5 | 1971 | 123.5 | 1972 | 109.8 | 1973 | 109.8 | 1974 | 109.8 |
| 1964 | 147.8 | 1965 | 147.8 | 1966 | 147.8 | 1967 | 147.8 | 1968 | 119.9 | 1969 | 119.9 | 1970 | 121.9 | 1971 | 121.9 | 1972 | 108.5 | 1973 | 108.5 | 1974 | 108.5 | 1975 | 78.1 |
| 1965 | 146.6 | 1966 | 146.6 | 1967 | 146.6 | 1968 | 118.5 | 1969 | 118.5 | 1970 | 120.2 | 1971 | 120.2 | 1972 | 107.2 | 1973 | 107.2 | 1974 | 107.2 | 1975 | 76.7 | 1976 | 76.7 |
| 1966 | 145.3 | 1967 | 145.3 | 1968 | 117.0 | 1969 | 117.0 | 1970 | 118.4 | 1971 | 118.4 | 1972 | 105.8 | 1973 | 105.8 | 1974 | 105.8 | 1975 | 75.2 | 1976 | 75.2 | 1977 | 49.2 |
| 1967 | 143.9 | 1968 | 115.4 | 1969 | 115.4 | 1970 | 116.4 | 1971 | 116.4 | 1972 | 104.3 | 1973 | 104.3 | 1974 | 104.3 | 1975 | 73.6 | 1976 | 73.6 | 1977 | 47.6 | 1978 | 70.3 |
| 1968 | 113.8 | 1969 | 113.8 | 1970 | 114.4 | 1971 | 114.4 | 1972 | 102.7 | 1973 | 102.7 | 1974 | 102.7 | 1975 | 71.9 | 1976 | 71.9 | 1977 | 45.9 | 1978 | 68.7 | 1979 | 68.7 |
| 1969 | 112.0 | 1970 | 112.2 | 1971 | 112.2 | 1972 | 101.0 | 1973 | 101.0 | 1974 | 101.0 | 1975 | 70.2 | 1976 | 70.2 | 1977 | 44.2 | 1978 | 66.9 | 1979 | 66.9 | 1980 | 30.4 |
| 1970 | 110.0 | 1971 | 110.0 | 1972 | 99.2 | 1973 | 99.2 | 1974 | 99.2 | 1975 | 68.3 | 1976 | 68.3 | 1977 | 42.3 | 1978 | 65.0 | 1979 | 65.0 | 1980 | 29.9 | 1981 | 43.3 |
| 1971 | 107.5 | 1972 | 97.3 | 1973 | 97.3 | 1974 | 97.3 | 1975 | 66.3 | 1976 | 66.3 | 1977 | 40.3 | 1978 | 63.0 | 1979 | 63.0 | 1980 | 29.3 | 1981 | 40.8 | 1982 | 36.8 |
| 1972 | 95.3 | 1973 | 95.3 | 1974 | 95.3 | 1975 | 64.1 | 1976 | 64.1 | 1977 | 38.2 | 1978 | 60.9 | 1979 | 60.9 | 1980 | 28.7 | 1981 | 38.1 | 1982 | 34.2 | 1983 | 32.3 |
| 1973 | 93.2 | 1974 | 93.2 | 1975 | 61.9 | 1976 | 61.9 | 1977 | 35.9 | 1978 | 58.6 | 1979 | 58.6 | 1980 | 28.1 | 1981 | 35.3 | 1982 | 31.3 | 1983 | 29.4 | 1984 | 29.2 |
| 1974 | 91.0 | 1975 | 59.5 | 1976 | 59.5 | 1977 | 33.5 | 1978 | 56.2 | 1979 | 56.2 | 1980 | 27.4 | 1981 | 32.3 | 1982 | 28.3 | 1983 | 26.4 | 1984 | 26.0 | 1985 | 24.7 |
| 1975 | 57.0 | 1976 | 57.0 | 1977 | 31.0 | 1978 | 53.7 | 1979 | 53.7 | 1980 | 26.7 | 1981 | 29.2 | 1982 | 25.1 | 1983 | 23.1 | 1984 | 22.5 | 1985 | 21.4 | 1986 | 21.4 |
| 1976 | 54.3 | 1977 | 28.4 | 1978 | 51.1 | 1979 | 51.1 | 1980 | 25.9 | 1981 | 25.8 | 1982 | 21.7 | 1983 | 19.7 | 1984 | 18.9 | 1985 | 18.0 | 1986 | 18.0 | 1987 | 16.9 |
| 1977 | 25.5 | 1978 | 48.2 | 1979 | 48.2 | 1980 | 25.1 | 1981 | 22.2 | 1982 | 18.1 | 1983 | 16.1 | 1984 | 15.0 | 1985 | 14.3 | 1986 | 14.3 | 1987 | 13.4 | 1988 | 13.4 |
| 1978 | 45.2 | 1979 | 45.2 | 1980 | 24.3 | 1981 | 18.5 | 1982 | 14.3 | 1983 | 12.2 | 1984 | 10.9 | 1985 | 10.4 | 1986 | 10.4 | 1987 | 9.8 | 1988 | 9.8 | 1989 | 9.8 |
| 1979 | 42.1 | 1980 | 23.4 | 1981 | 14.5 | 1982 | 10.3 | 1983 | 8.2 | 1984 | 6.6 | 1985 | 6.3 | 1986 | 6.3 | 1987 | 6.0 | 1988 | 6.0 | 1989 | 6.0 | 1990 | 5.9 |
| 1980 | 22.8 | 1981 | 11.9 | 1982 | 7.7 | 1983 | 5.5 | 1984 | 3.7 | 1985 | 3.7 | 1986 | 3.7 | 1987 | 3.5 | 1988 | 3.5 | 1989 | 3.5 | 1990 | 3.5 | 1991 | 3.5 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 112.1 | 1974 | 112.1 | 1975 | 81.9 | 1976 | 81.9 | 1977 | 55.9 | 1978 | 78.6 | 1979 | 78.6 | 1980 | 33.7 | 1981 | 60.5 | 1982 | 56.7 | 1983 | 55.2 | 1984 | 56.7 |
| 1974 | 111.0 | 1975 | 80.7 | 1976 | 80.7 | 1977 | 54.7 | 1978 | 77.5 | 1979 | 77.5 | 1980 | 33.4 | 1981 | 59.0 | 1982 | 55.2 | 1983 | 53.6 | 1984 | 55.0 | 1985 | 52.1 |
| 1975 | 79.5 | 1976 | 79.5 | 1977 | 53.5 | 1978 | 76.2 | 1979 | 76.2 | 1980 | 33.0 | 1981 | 57.4 | 1982 | 53.6 | 1983 | 52.0 | 1984 | 53.3 | 1985 | 50.5 | 1986 | 50.5 |
| 1976 | 78.1 | 1977 | 52.1 | 1978 | 74.9 | 1979 | 74.9 | 1980 | 32.6 | 1981 | 55.7 | 1982 | 51.9 | 1983 | 50.3 | 1984 | 51.5 | 1985 | 48.7 | 1986 | 48.7 | 1987 | 45.6 |
| 1977 | 50.7 | 1978 | 73.4 | 1979 | 73.4 | 1980 | 32.2 | 1981 | 54.0 | 1982 | 50.1 | 1983 | 48.5 | 1984 | 49.5 | 1985 | 46.9 | 1986 | 46.9 | 1987 | 43.9 | 1988 | 43.9 |
| 1978 | 71.9 | 1979 | 71.9 | 1980 | 31.8 | 1981 | 52.1 | 1982 | 48.2 | 1983 | 46.6 | 1984 | 47.5 | 1985 | 45.0 | 1986 | 45.0 | 1987 | 42.1 | 1988 | 42.1 | 1989 | 42.1 |
| 1979 | 70.3 | 1980 | 31.4 | 1981 | 50.1 | 1982 | 46.2 | 1983 | 44.5 | 1984 | 45.3 | 1985 | 42.9 | 1986 | 42.9 | 1987 | 40.2 | 1988 | 40.2 | 1989 | 40.2 | 1990 | 39.2 |
| 1980 | 30.9 | 1981 | 47.9 | 1982 | 44.1 | 1983 | 42.3 | 1984 | 43.0 | 1985 | 40.7 | 1986 | 40.7 | 1987 | 38.1 | 1988 | 38.1 | 1989 | 38.1 | 1990 | 37.2 | 1991 | 37.2 |
| 1981 | 45.7 | 1982 | 41.8 | 1983 | 40.0 | 1984 | 40.5 | 1985 | 38.4 | 1986 | 38.4 | 1987 | 36.0 | 1988 | 36.0 | 1989 | 36.0 | 1990 | 35.1 | 1991 | 35.1 | 1992 | 35.1 |
| 1982 | 39.4 | 1983 | 37.6 | 1984 | 38.0 | 1985 | 36.0 | 1986 | 36.0 | 1987 | 33.7 | 1988 | 33.7 | 1989 | 33.7 | 1990 | 32.9 | 1991 | 32.9 | 1992 | 32.9 | 1993 | 32.9 |
| 1983 | 35.0 | 1984 | 35.2 | 1985 | 33.4 | 1986 | 33.4 | 1987 | 31.3 | 1988 | 31.3 | 1989 | 31.3 | 1990 | 30.5 | 1991 | 30.5 | 1992 | 30.5 | 1993 | 30.5 | 1994 | 30.5 |
| 1984 | 32.3 | 1985 | 30.6 | 1986 | 30.6 | 1987 | 28.7 | 1988 | 28.7 | 1989 | 28.7 | 1990 | 28.1 | 1991 | 28.1 | 1992 | 28.1 | 1993 | 28.1 | 1994 | 28.1 | 1995 | 28.1 |
| 1985 | 27.7 | 1986 | 27.7 | 1987 | 26.0 | 1988 | 26.0 | 1989 | 26.0 | 1990 | 25.4 | 1991 | 25.4 | 1992 | 25.4 | 1993 | 25.4 | 1994 | 25.4 | 1995 | 25.4 | 1996 | 25.4 |
| 1986 | 24.7 | 1987 | 23.1 | 1988 | 23.1 | 1989 | 23.1 | 1990 | 22.6 | 1991 | 22.6 | 1992 | 22.6 | 1993 | 22.6 | 1994 | 22.6 | 1995 | 22.6 | 1996 | 22.6 | 1997 | 22.6 |
| 1987 | 20.1 | 1988 | 20.1 | 1989 | 20.1 | 1990 | 19.6 | 1991 | 19.6 | 1992 | 19.6 | 1993 | 19.6 | 1994 | 19.6 | 1995 | 19.6 | 1996 | 19.6 | 1997 | 19.6 | 1998 | 19.6 |
| 1988 | 16.9 | 1989 | 16.9 | 1990 | 16.5 | 1991 | 16.5 | 1992 | 16.5 | 1993 | 16.5 | 1994 | 16.5 | 1995 | 16.5 | 1996 | 16.5 | 1997 | 16.5 | 1998 | 16.5 | 1999 | 16.5 |
| 1989 | 13.4 | 1990 | 13.2 | 1991 | 13.2 | 1992 | 13.2 | 1993 | 13.2 | 1994 | 13.2 | 1995 | 13.2 | 1996 | 13.2 | 1997 | 13.2 | 1998 | 13.2 | 1999 | 13.2 | 2000 | 13.2 |
| 1990 | 9.7 | 1991 | 9.7 | 1992 | 9.7 | 1993 | 9.7 | 1994 | 9.7 | 1995 | 9.7 | 1996 | 9.7 | 1997 | 9.7 | 1998 | 9.7 | 1999 | 9.7 | 2000 | 9.7 | 2001 | 9.7 |
| 1991 | 5.9 | 1992 | 5.9 | 1993 | 5.9 | 1994 | 5.9 | 1995 | 5.9 | 1996 | 5.9 | 1997 | 5.9 | 1998 | 5.9 | 1999 | 5.9 | 2000 | 5.9 | 2001 | 5.9 | 2002 | 5.9 |
| 1992 | 3.5 | 1993 | 3.5 | 1994 | 3.5 | 1995 | 3.5 | 1996 | 3.5 | 1997 | 3.5 | 1998 | 3.5 | 1999 | 3.5 | 2000 | 3.5 | 2001 | 3 | 2002 | 3.5 | 2003 | 3.5 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.1.4.

TABLE 2.1.2C

DATE : MAY 25, 1985

# EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED VEHICLES NOx

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 2.0 | 1962 | 2.0 | 1963 | 2.0 | 1964 | 2.0 | 1965 | 2.0 | 1966 | 2.0 | 1967 | 2.0 | 1968 | 2.9 | 1969 | 2.9 | 1970 | 2.9 | 1971 | 2.9 | 1972 | 2.9 |
| 1962 | 2.0 | 1963 | 2.0 | 1964 | 2.0 | 1965 | 2.0 | 1966 | 2.0 | 1967 | 2.0 | 1968 | 2.9 | 1969 | 2.9 | 1970 | 2.9 | 1971 | 2.9 | 1972 | 2.9 | 1973 | 2.5 |
| 1963 | 2.0 | 1964 | 2.0 | 1965 | 2.0 | 1966 | 2.0 | 1967 | 2.0 | 1968 | 2.9 | 1969 | 2.9 | 1970 | 2.9 | 1971 | 2.9 | 1972 | 2.9 | 1973 | 2.5 | 1974 | 2.5 |
| 1964 | 2.0 | 1965 | 2.0 | 1966 | 2.0 | 1967 | 2.0 | 1968 | 2.9 | 1969 | 2.9 | 1970 | 2.9 | 1971 | 2.9 | 1972 | 2.9 | 1973 | 2.4 | 1974 | 2.4 | 1975 | 2.1 |
| 1965 | 2.0 | 1966 | 2.0 | 1967 | 2.0 | 1968 | 2.9 | 1969 | 2.9 | 1970 | 2.9 | 1971 | 2.9 | 1972 | 2.9 | 1973 | 2.4 | 1974 | 2.4 | 1975 | 2.1 | 1976 | 2.1 |
| 1966 | 2.0 | 1967 | 2.0 | 1968 | 2.9 | 1969 | 2.9 | 1970 | 2.9 | 1971 | 2.9 | 1972 | 2.9 | 1973 | 2.4 | 1974 | 2.4 | 1975 | 2.1 | 1976 | 2.1 | 1977 | 2.5 |
| 1967 | 2.0 | 1968 | 2.9 | 1969 | 2.9 | 1970 | 2.9 | 1971 | 2.9 | 1972 | 2.9 | 1973 | 2.4 | 1974 | 2.4 | 1975 | 2.1 | 1976 | 2.1 | 1977 | 2.5 | 1978 | 2.1 |
| 1968 | 2.9 | 1969 | 2.9 | 1970 | 2.9 | 1971 | 2.9 | 1972 | 2.9 | 1973 | 2.4 | 1974 | 2.4 | 1975 | 2.0 | 1976 | 2.0 | 1977 | 2.4 | 1978 | 2.0 | 1979 | 2.0 |
| 1969 | 2.9 | 1970 | 2.9 | 1971 | 2.9 | 1972 | 2.9 | 1973 | 2.3 | 1974 | 2.3 | 1975 | 2.0 | 1976 | 2.0 | 1977 | 2.4 | 1978 | 1.9 | 1979 | 1.9 | 1980 | 1.6 |
| 1970 | 2.9 | 1971 | 2.9 | 1972 | 2.9 | 1973 | 2.3 | 1974 | 2.3 | 1975 | 2.0 | 1976 | 2.0 | 1977 | 2.3 | 1978 | 1.9 | 1979 | 1.9 | 1980 | 1.5 | 1981 | 1.2 |
| 1971 | 2.9 | 1972 | 2.9 | 1973 | 2.3 | 1974 | 2.3 | 1975 | 2.0 | 1976 | 2.0 | 1977 | 2.2 | 1978 | 1.8 | 1979 | 1.8 | 1980 | 1.4 | 1981 | 1.2 | 1982 | 1.3 |
| 1972 | 2.9 | 1973 | 2.2 | 1974 | 2.2 | 1975 | 1.9 | 1976 | 1.9 | 1977 | 2.2 | 1978 | 1.7 | 1979 | 1.7 | 1980 | 1.4 | 1981 | 1.1 | 1982 | 1.3 | 1983 | 1.2 |
| 1973 | 2.2 | 1974 | 2.2 | 1975 | 1.9 | 1976 | 1.9 | 1977 | 2.1 | 1978 | 1.7 | 1979 | 1.7 | 1980 | 1.3 | 1981 | 1.0 | 1982 | 1.2 | 1983 | 1.1 | 1984 | 1.2 |
| 1974 | 2.2 | 1975 | 1.9 | 1976 | 1.9 | 1977 | 2.0 | 1978 | 1.6 | 1979 | 1.6 | 1980 | 1.3 | 1981 | 1.0 | 1982 | 1.1 | 1983 | 1.1 | 1984 | 1.1 | 1985 | 1.1 |
| 1975 | 1.9 | 1976 | 1.9 | 1977 | 1.9 | 1978 | 1.5 | 1979 | 1.5 | 1980 | 1.2 | 1981 | 0.9 | 1982 | 1.0 | 1983 | 1.0 | 1984 | 1.0 | 1985 | 1.0 | 1986 | 1.0 |
| 1976 | 1.8 | 1977 | 1.8 | 1978 | 1.4 | 1979 | 1.4 | 1980 | 1.1 | 1981 | 0.8 | 1982 | 1.0 | 1983 | 0.9 | 1984 | 0.9 | 1985 | 0.9 | 1986 | 0.9 | 1987 | 1.0 |
| 1977 | 1.7 | 1978 | 1.3 | 1979 | 1.3 | 1980 | 1.1 | 1981 | 0.7 | 1982 | 0.9 | 1983 | 0.8 | 1984 | 0.8 | 1985 | 0.8 | 1986 | 0.8 | 1987 | 0.9 | 1988 | 0.9 |
| 1978 | 1.2 | 1979 | 1.2 | 1980 | 1.0 | 1981 | 0.6 | 1982 | 0.8 | 1983 | 0.7 | 1984 | 0.7 | 1985 | 0.7 | 1986 | 0.7 | 1987 | 0.8 | 1988 | 0.8 | 1989 | 0.8 |
| 1979 | 1.1 | 1980 | 0.9 | 1981 | 0.5 | 1982 | 0.7 | 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 |
| 1980 | 0.8 | 1981 | 0.5 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 | 1991 | 0.6 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 2.5 | 1974 | 2.5 | 1975 | 2.1 | 1976 | 2.1 | 1977 | 2.8 | 1978 | 2.4 | 1979 | 2.4 | 1980 | 1.9 | 1981 | 1.7 | 1982 | 1.8 | 1983 | 1.8 | 1984 | 1.9 |
| 1974 | 2.5 | 1975 | 2.1 | 1976 | 2.1 | 1977 | 2.7 | 1978 | 2.3 | 1979 | 2.3 | 1980 | 1.8 | 1981 | 1.6 | 1982 | 1.8 | 1983 | 1.7 | 1984 | 1.9 | 1985 | 1.9 |
| 1975 | 2.1 | 1976 | 2.1 | 1977 | 2.7 | 1978 | 2.3 | 1979 | 2.3 | 1980 | 1.8 | 1981 | 1.6 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.8 | 1985 | 1.8 | 1986 | 1.8 |
| 1976 | 2.1 | 1977 | 2.6 | 1978 | 2.2 | 1979 | 2.2 | 1980 | 1.8 | 1981 | 1.5 | 1982 | 1.7 | 1983 | 1.6 | 1984 | 1.8 | 1985 | 1.8 | 1986 | 1.8 | 1987 | 1.9 |
| 1977 | 2.6 | 1978 | 2.2 | 1979 | 2.2 | 1980 | 1.7 | 1981 | 1.5 | 1982 | 1.6 | 1983 | 1.6 | 1984 | 1.7 | 1985 | 1.7 | 1986 | 1.7 | 1987 | 1.8 | 1988 | 1.8 |
| 1978 | 2.1 | 1979 | 2.1 | 1980 | 1.7 | 1981 | 1.5 | 1982 | 1.6 | 1983 | 1.6 | 1984 | 1.7 | 1985 | 1.7 | 1986 | 1.7 | 1987 | 1.8 | 1988 | 1.8 | 1989 | 1.8 |
| 1979 | 2.1 | 1980 | 1.6 | 1981 | 1.4 | 1982 | 1.5 | 1983 | 1.5 | 1984 | 1.6 | 1985 | 1.6 | 1986 | 1.6 | 1987 | 1.7 | 1988 | 1.7 | 1989 | 1.7 | 1990 | 1.7 |
| 1980 | 1.6 | 1981 | 1.4 | 1982 | 1.5 | 1983 | 1.5 | 1984 | 1.5 | 1985 | 1.5 | 1986 | 1.5 | 1987 | 1.7 | 1988 | 1.7 | 1989 | 1.7 | 1990 | 1.7 | 1991 | 1.7 |
| 1981 | 1.3 | 1982 | 1.4 | 1983 | 1.4 | 1984 | 1.5 | 1985 | 1.5 | 1986 | 1.5 | 1987 | 1.6 | 1988 | 1.6 | 1989 | 1.6 | 1990 | 1.6 | 1991 | 1.6 | 1992 | 1.6 |
| 1982 | 1.4 | 1983 | 1.3 | 1984 | 1.4 | 1985 | 1.4 | 1986 | 1.4 | 1987 | 1.5 | 1988 | 1.5 | 1989 | 1.5 | 1990 | 1.5 | 1991 | 1.5 | 1992 | 1.5 | 1993 | 1.5 |
| 1983 | 1.3 | 1984 | 1.4 | 1985 | 1.4 | 1986 | 1.4 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 | 1991 | 1.4 | 1992 | 1.4 | 1993 | 1.4 | 1994 | 1.4 |
| 1984 | 1.3 | 1985 | 1.3 | 1986 | 1.3 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 | 1991 | 1.4 | 1992 | 1.4 | 1993 | 1.4 | 1994 | 1.4 | 1995 | 1.4 |
| 1985 | 1.2 | 1986 | 1.2 | 1987 | 1.3 | 1988 | 1.3 | 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 | 1993 | 1.3 | 1994 | 1.3 | 1995 | 1.3 | 1996 | 1.3 |
| 1986 | 1.1 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 | 1991 | 1.2 | 1992 | 1.2 | 1993 | 1.2 | 1994 | 1.2 | 1995 | 1.2 | 1996 | 1.2 | 1997 | 1.2 |
| 1987 | 1.1 | 1988 | 1.1 | 1989 | 1.1 | 1990 | 1.1 | 1991 | 1.1 | 1992 | 1.1 | 1993 | 1.1 | 1994 | 1.1 | 1995 | 1.1 | 1996 | 1.1 | 1997 | 1.1 | 1998 | 1.1 |
| 1988 | 1.0 | 1989 | 1.0 | 1990 | 1.0 | 1991 | 1.0 | 1992 | 1.0 | 1993 | 1.0 | 1994 | 1.0 | 1995 | 1.0 | 1996 | 1.0 | 1997 | 1.0 | 1998 | 1.0 | 1999 | 1.0 |
| 1989 | 0.9 | 1990 | 0.9 | 1991 | 0.9 | 1992 | 0.9 | 1993 | 0.9 | 1994 | 0.9 | 1995 | 0.9 | 1996 | 0.9 | 1997 | 0.9 | 1998 | 0.9 | 1999 | 0.9 | 2000 | 0.9 |
| 1990 | 0.8 | 1991 | 0.8 | 1992 | 0.8 | 1993 | 0.8 | 1994 | 0.8 | 1995 | 0.8 | 1996 | 0.8 | 1997 | 0.8 | 1998 | 0.8 | 1999 | 0.8 | 2000 | 0.8 | 2001 | 0.8 |
| 1991 | 0.6 | 1992 | 0.6 | 1993 | 0.6 | 1994 | 0.6 | 1995 | 0.6 | 1996 | 0.6 | 1997 | 0.6 | 1998 | 0.6 | 1999 | 0.6 | 2000 | 0.6 | 2001 | 0.6 | 2002 | 0.6 |
| 1992 | 0.6 | 1993 | 0.6 | 1994 | 0.6 | 1995 | 0.6 | 1996 | 0.6 | 1997 | 0.6 | 1998 | 0.6 | 1999 | 0.6 | 2000 | 0.6 | 2001 | 0.6 | 2002 | 0.6 | 2003 | 0.6 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.1.4.

## TABLE 2.1.3

## IDLE EMISSION RATES FOR
## HIGH ALTITUDE
## LIGHT DUTY GASOLINE POWERED VEHICLES

* IER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Min.) | Deterioration Rate (Gm/Min/10K Mi) |
|---|---|---|---|
| HC | Pre-1968 | 1.63 | 0.03 |
| | 1968-1969 | 0.76 | 0.06 |
| | 1970-1971 | 0.71 | 0.07 |
| | 1972-1974 | 0.74 | 0.04 |
| | 1975-1976 | 0.27 | 0.07 |
| | 1977 | 0.12 | 0.03 |
| | 1978-1979 | 0.24 | 0.03 |
| | 1980 | 0.05 | 0.03 |
| | 1981 | 0.07 | 0.03 |
| | 1982 | 0.06 | 0.03 |
| | 1983 | 0.06 | 0.03 |
| | 1984 | 0.06 | 0.03 |
| | 1985-1989 | 0.05 | 0.03 |
| | 1990+ | 0.05 | 0.03 |
| CO | Pre-1968 | 15.98 | 0.40 |
| | 1968-1969 | 11.24 | 0.63 |
| | 1970-1971 | 12.93 | 0.88 |
| | 1972-1974 | 13.99 | 0.76 |
| | 1975-1976 | 7.42 | 0.85 |
| | 1977 | 2.87 | 0.42 |
| | 1978-1979 | 5.79 | 0.42 |
| | 1980 | 2.68 | 0.42 |
| | 1981 | 1.74 | 0.61 |
| | 1982 | 1.46 | 0.61 |
| | 1983 | 1.44 | 0.61 |
| | 1984 | 1.06 | 0.62 |
| | 1985-1986 | 1.06 | 0.62 |
| | 1987-1989 | 1.06 | 0.62 |
| | 1990+ | 1.06 | 0.62 |
| NOx | Pre-1968 | 0.11 | 0.0 |
| | 1968-1972 | 0.09 | 0.0 |
| | 1973-1974 | 0.07 | 0.0 |
| | 1975-1976 | 0.07 | 0.0 |
| | 1977 | 0.06 | 0.0 |
| | 1978-1979 | 0.04 | 0.0 |
| | 1980 | 0.04 | 0.0 |
| | 1981 | 0.03 | 0.01 |
| | 1982 | 0.03 | 0.01 |
| | 1983 | 0.03 | 0.01 |
| | 1984 | 0.03 | 0.01 |
| | 1985-1986 | 0.03 | 0.01 |
| | 1987-1989 | 0.03 | 0.01 |
| | 1990+ | 0.03 | 0.01 |

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

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## TABLE 2.1.4

## REGISTRATION MIX AND MILEAGE ACCUMULATION RATES FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED VEHICLES

| Model Year Index** | July 1 Registration Mix* | Mileage Accumulation Rate per vehicle* | Jan 1 Registration Mix | Jan 1 Mileage Accumulation Rate (fleet) | Jan 1 Mileage Accumulation (fleet) |
|---|---|---|---|---|---|
| 1 | 0.080 | 12818. | 0.027 | 12818. | 1602. |
| 2 | 0.101 | 12102. | 0.101 | 12639. | 9591. |
| 3 | 0.095 | 11427. | 0.095 | 11933. | 21873. |
| 4 | 0.089 | 10789. | 0.089 | 11267. | 33470. |
| 5 | 0.083 | 10187. | 0.083 | 10638. | 44420. |
| 6 | 0.077 | 9619. | 0.077 | 10045. | 54758. |
| 7 | 0.071 | 9082. | 0.071 | 9485. | 64520. |
| 8 | 0.065 | 8575. | 0.065 | 8955. | 73738. |
| 9 | 0.059 | 8096. | 0.059 | 8455. | 82440. |
| 10 | 0.053 | 7645. | 0.053 | 7983. | 90657. |
| 11 | 0.047 | 7218. | 0.047 | 7538. | 98415. |
| 12 | 0.041 | 6815. | 0.041 | 7117. | 105740. |
| 13 | 0.035 | 6435. | 0.035 | 6720. | 112657. |
| 14 | 0.029 | 6076. | 0.029 | 6345. | 119187. |
| 15 | 0.023 | 5737. | 0.023 | 5991. | 125354. |
| 16 | 0.017 | 5416. | 0.017 | 5657. | 131176. |
| 17 | 0.011 | 5114. | 0.011 | 5340. | 136673. |
| 18 | 0.008 | 4829. | 0.008 | 5043. | 141863. |
| 19 | 0.006 | 4559. | 0.006 | 4761. | 146763. |
| 20+ | 0.008 | 4305. | 0.008 | 4495. | 151390. |

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

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## TABLE 2.1.5

## EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED VEHICLES JANUARY 1, 1988

| Model Years | (A) LDV Fleet Registration | (B) Sales Fraction | (A*B) | (C=A*B/DAF) LDGV Registration | (D) Annual Mileage Accrual Rate | (C*D) | (C*D/TFNORM) Travel Fractions |
|---|---|---|---|---|---|---|---|
| 1988 | 0.027 | 0.910 | 0.024 | 0.027 | 12818. | 345.4 | 0.036 |
| 1987 | 0.101 | 0.920 | 0.093 | 0.103 | 12639. | 1304.3 | 0.137 |
| 1986 | 0.095 | 0.923 | 0.088 | 0.097 | 11933. | 1162.1 | 0.122 |
| 1985 | 0.089 | 0.934 | 0.083 | 0.092 | 11267. | 1040.2 | 0.109 |
| 1984 | 0.083 | 0.940 | 0.078 | 0.087 | 10638. | 921.8 | 0.097 |
| 1983 | 0.077 | 0.947 | 0.073 | 0.081 | 10045. | 813.5 | 0.085 |
| 1982 | 0.071 | 0.954 | 0.068 | 0.075 | 9485. | 713.5 | 0.075 |
| 1981 | 0.065 | 0.939 | 0.061 | 0.068 | 8955. | 607.0 | 0.064 |
| 1980 | 0.059 | 0.966 | 0.057 | 0.063 | 8455. | 535.2 | 0.056 |
| 1979 | 0.053 | 0.972 | 0.052 | 0.057 | 7983. | 456.7 | 0.048 |
| 1978 | 0.047 | 0.991 | 0.047 | 0.052 | 7538. | 389.9 | 0.041 |
| 1977 | 0.041 | 0.996 | 0.041 | 0.045 | 7117. | 322.8 | 0.034 |
| 1976 | 0.035 | 0.997 | 0.035 | 0.039 | 6720. | 260.4 | 0.027 |
| 1975 | 0.029 | 0.997 | 0.029 | 0.032 | 6345. | 203.7 | 0.021 |
| 1974 | 0.023 | 1.000 | 0.023 | 0.026 | 5991. | 153.0 | 0.016 |
| 1973 | 0.017 | 1.000 | 0.017 | 0.019 | 5657. | 106.8 | 0.011 |
| 1972 | 0.011 | 1.000 | 0.011 | 0.012 | 5340. | 65.2 | 0.007 |
| 1971 | 0.008 | 1.000 | 0.008 | 0.009 | 5043. | 44.8 | 0.005 |
| 1970 | 0.006 | 1.000 | 0.006 | 0.007 | 4761. | 31.7 | 0.003 |
| 1969- | 0.008 | 1.000 | 0.008 | 0.009 | 4495. | 39.9 | 0.004 |
|  |  | DAF: | 0.902 |  | TFNORM: | 9518.0 |  |

WHERE :

A = January 1 registration mix from Table 2.1.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 2.1.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI) = .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

NOTE : In general, the travel weighting fractions will change for every calendar year since the sales fraction (column B) changes for almost every model year.

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## TABLE 2.1.6

## SPEED CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED VEHICLES

$$* \; SCF(s,sadj) = SF(s)/SF(sadj)$$

$$SF(s) = EXP(A + B*s + C*s^2 + D*S^3 + E*s^4 + F*s^5), \; HC \; \& \; CO$$
$$= A + B*s + C*s^2 + D*s^3 + E*s^4 + F*s^5 \; , \; NOx$$

| Pollutant and Model Years | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| HC | | | | | | |
| Pre-1968 | 0.224612E+01 | -0.290973E+00 | 0.158890E-01 | -0.472494E-03 | 0.694077E-05 | -0.392798E-07 |
| 1968 | 0.202779E+01 | -0.273049E+00 | 0.153577E-01 | -0.460304E-03 | 0.678527E-05 | -0.384880E-07 |
| 1969 | 0.215056E+01 | -0.283620E+00 | 0.153836E-01 | -0.442136E-03 | 0.628732E-05 | -0.346311E-07 |
| 1970 | 0.223021E+01 | -0.293648E+00 | 0.162356E-01 | -0.484148E-03 | 0.711591E-05 | -0.402861E-07 |
| 1971 | 0.212230E+01 | -0.291072E+00 | 0.169089E-01 | -0.526148E-03 | 0.802705E-05 | -0.470117E-07 |
| 1972 | 0.215361E+01 | -0.283451E+00 | 0.156948E-01 | -0.469759E-03 | 0.693832E-05 | -0.394707E-07 |
| 1973-1974 | 0.211340E+01 | -0.285676E+00 | 0.163180E-01 | -0.500793E-03 | 0.755067E-05 | -0.437187E-07 |
| 1975+ | 0.239540E+01 | -0.335781E+00 | 0.211609E-01 | -0.731550E-03 | 0.120715E-04 | -0.748566E-07 |
| CO | | | | | | |
| Pre-1968 | 0.181978E+01 | -0.254663E+00 | 0.152347E-01 | -0.487397E-03 | 0.758207E-05 | -0.449514E-07 |
| 1968 | 0.186919E+01 | -0.276679E+00 | 0.172335E-01 | -0.558279E-03 | 0.871678E-05 | -0.516980E-07 |
| 1969 | 0.182133E+01 | -0.272054E+00 | 0.170304E-01 | -0.552021E-03 | 0.862543E-05 | -0.511440E-07 |
| 1970 | 0.201421E+01 | -0.295188E+00 | 0.186353E-01 | -0.621606E-03 | 0.993657E-05 | -0.599779E-07 |
| 1971 | 0.204533E+01 | -0.310618E+00 | 0.204852E-01 | -0.708527E-03 | 0.116215E-04 | -0.715690E-07 |
| 1972 | 0.231868E+01 | -0.341147E+00 | 0.209446E-01 | -0.665891E-03 | 0.102225E-04 | -0.598264E-07 |
| 1973-1974 | 0.215487E+01 | -0.329116E+00 | 0.210112E-01 | -0.689057E-03 | 0.108390E-04 | -0.647125E-07 |
| 1975+ | 0.248747E+01 | -0.391562E+00 | 0.270721E-01 | -0.976178E-03 | 0.165270E-04 | -0.104317E-06 |
| NOx | | | | | | |
| Pre-1968 | 0.244424E+01 | -0.250107E+00 | 0.138293E-01 | -0.287025E-03 | 0.207585E-05 | 0.0 |
| 1968 | 0.188656E+01 | -0.161289E+00 | 0.904995E-02 | -0.185609E-03 | 0.132555E-05 | 0.0 |
| 1969 | 0.155777E+01 | -0.113032E+00 | 0.671832E-02 | -0.143409E-03 | 0.106079E-05 | 0.0 |
| 1970 | 0.204516E+01 | -0.194014E+00 | 0.110736E-01 | -0.231754E-03 | 0.168372E-05 | 0.0 |
| 1971 | 0.163262E+01 | -0.121861E+00 | 0.703020E-02 | -0.146293E-03 | 0.106141E-05 | 0.0 |
| 1972 | 0.144825E+01 | -0.122444E+00 | 0.795024E-02 | -0.171078E-03 | 0.125777E-05 | 0.0 |
| 1973-1974 | 0.153447E+01 | -0.125671E+00 | 0.785919E-02 | -0.169428E-03 | 0.125494E-05 | 0.0 |
| 1975+ | 0.942131E+00 | -0.423240E-01 | 0.386253E-02 | -0.939853E-04 | 0.753883E-06 | 0.0 |

* WHERE :
s = average speed (mph)
sadj = basic test procedure speed; adjusted for fraction of cold start operation x and fraction of hot start operation w, [ $1/sadj = (w+x)/26 + (1-w-x)/16$ ]

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## TABLE 2.1.7A

## TEMPERATURE CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED VEHICLES

* TCF(b) = EXP( TC(b) * (T - 75.0))

| Pol | Model Years | Test segment 1 | | Test segment 2 | | Test segment 3 | |
|---|---|---|---|---|---|---|---|
| | | TC Low | TC High | TC Low | TC High | TC Low | TC High |
| HC | Pre-1968 | -0.20623E-01 | -0.14381E-01 | -0.24032E-02 | 0.13219E-02 | -0.10081E-02 | 0.34799E-02 |
| | 1968-1969 | -0.24462E-01 | -0.12552E-01 | -0.32017E-02 | 0.42667E-02 | -0.86884E-03 | 0.75843E-02 |
| | 1970-1971 | -0.21255E-01 | -0.10888E-01 | -0.52755E-03 | -0.47925E-03 | 0.93659E-03 | 0.76666E-02 |
| | 1972-1974 | -0.21427E-01 | -0.66107E-02 | -0.39442E-03 | 0.26288E-02 | 0.49731E-02 | 0.12320E-01 |
| | 1975-1979 | -0.23517E-01 | -0.14095E-01 | -0.88057E-02 | 0.26179E-01 | -0.16222E-02 | 0.24297E-01 |
| | 1980 | -0.27793E-01 | -0.14095E-01 | -0.10177E-01 | 0.26179E-01 | -0.82680E-02 | 0.24297E-01 |
| | 1981+ | -0.33883E-01 | 0.11959E-01 | -0.10113E-01 | -0.12627E-04 | -0.80650E-02 | 0.78765E-02 |
| CO | Pre-1968 | -0.13487E-01 | -0.14691E-01 | 0.15784E-02 | 0.37462E-02 | 0.11097E-02 | 0.11014E-01 |
| | 1968-1969 | -0.21126E-01 | -0.38767E-01 | -0.15289E-02 | 0.84685E-02 | 0.15749E-02 | 0.25179E-01 |
| | 1970-1971 | -0.20843E-01 | -0.21165E-01 | -0.59951E-02 | 0.23603E-01 | 0.18253E-02 | 0.28483E-01 |
| | 1972-1974 | -0.19091E-01 | -0.13146E-01 | -0.42373E-03 | 0.24717E-01 | 0.57982E-02 | 0.25848E-01 |
| | 1975-1979 | -0.24835E-01 | -0.19612E-01 | -0.88336E-02 | 0.48537E-01 | -0.11553E-02 | 0.31439E-01 |
| | 1980 | see NOTE 2 | -0.19612E-01 | -0.17783E-01 | 0.48537E-01 | -0.10871E-01 | 0.31439E-01 |
| | 1981+ | see NOTE 2 | -0.12596E-01 | -0.18813E-01 | 0.13861E-01 | -0.11951E-01 | 0.96939E-02 |
| NOx | Pre-1968 | -0.16897E-03 | 0.38841E-02 | -0.89245E-02 | -0.87325E-02 | -0.72580E-02 | -0.10839E-01 |
| | 1968-1972 | -0.25074E-03 | -0.10389E-02 | -0.59791E-02 | -0.92466E-02 | -0.62690E-02 | -0.10108E-01 |
| | 1973-1974 | 0.38855E-02 | -0.18301E-01 | -0.24156E-02 | -0.10925E-01 | -0.21188E-02 | -0.18042E-01 |
| | 1975-1976 | -0.45504E-04 | -0.71420E-02 | -0.12575E-02 | -0.87910E-02 | -0.53153E-03 | -0.75470E-02 |
| | 1977-1979 | -0.76044E-02 | -0.26153E-01 | -0.68045E-02 | -0.18603E-01 | -0.54198E-02 | -0.20878E-01 |
| | 1980 | -0.30110E-02 | -0.26153E-01 | -0.67130E-02 | -0.18603E-01 | -0.45310E-02 | -0.20878E-01 |
| | 1981+ | -0.53710E-02 | -0.34416E-01 | -0.65050E-02 | -0.35871E-01 | -0.85650E-02 | -0.28830E-01 |

* WHERE :

TCF(b) = Temperature correction factor for appropriate pollutant, ambient temperature, and model year; for test segment b
T = Ambient temperature (Fahrenheit)
TC(b) = Temperature correction factor coefficient for appropriate pollutant; reference temperature and model year; for test segment b
75.0 = Reference temperature

NOTE 1 : The temperature correction factor is used in conjunction with the Ripstwxn correction factor given in Table 2.1.7B.

NOTE 2 : Offset model used for Bag 1 CO. Offset = -1.3812*(T - 75.0)

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TABLE 2.1.7B

### NORMALIZED BAG FRACTIONS FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED VEHICLES

| | | Normalized Fractions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Model | Test | Seg. #1 | Test | Seg. #2 | Test | Seg. #3 | Total | Test |
| Pol | Years | B1 | D1 | B2 | D2 | B3 | D3 | BO | DO |
| HC | Pre-1968 | 1.282 | 0.025 | 0.973 | 0.028 | 0.839 | 0.019 | 1.000 | 0.025 |
| | 1968-1969 | 1.345 | 0.074 | 0.946 | 0.054 | 0.842 | 0.048 | 1.000 | 0.056 |
| | 1970-1971 | 1.345 | 0.178 | 0.919 | 0.118 | 0.894 | 0.093 | 1.000 | 0.124 |
| | 1972-1974 | 1.398 | 0.060 | 0.885 | 0.055 | 0.919 | 0.036 | 1.000 | 0.051 |
| | 1975-1979 | 1.856 | 0.345 | 0.765 | 0.233 | 0.802 | 0.196 | 1.000 | 0.246 |
| | 1980 | 2.200 | 0.714 | 0.571 | 0.171 | 0.914 | 0.143 | 1.000 | 0.274 |
| | 1981 | 2.654 | 0.960 | 0.383 | 0.375 | 0.929 | 0.310 | 1.000 | 0.478 |
| | 1982 | 2.609 | 1.101 | 0.387 | 0.435 | 0.957 | 0.365 | 1.000 | 0.553 |
| | 1983 | 2.613 | 1.097 | 0.384 | 0.443 | 0.958 | 0.367 | 1.000 | 0.557 |
| | 1984 | 2.603 | 1.285 | 0.372 | 0.529 | 0.989 | 0.417 | 1.000 | 0.654 |
| | 1985-1986 | 2.617 | 1.173 | 0.371 | 0.510 | 0.981 | 0.404 | 1.000 | 0.618 |
| | 1987-1989 | 2.634 | 1.104 | 0.368 | 0.499 | 0.973 | 0.391 | 1.000 | 0.594 |
| | 1990+ | 2.639 | 1.051 | 0.368 | 0.489 | 0.969 | 0.385 | 1.000 | 0.577 |
| CO | Pre-1968 | 1.277 | 0.033 | 1.017 | 0.029 | 0.758 | 0.025 | 1.000 | 0.029 |
| | 1968-1969 | 1.442 | 0.071 | 0.996 | 0.042 | 0.674 | 0.033 | 1.000 | 0.046 |
| | 1970-1971 | 1.553 | 0.109 | 0.933 | 0.079 | 0.711 | 0.038 | 1.000 | 0.074 |
| | 1972-1974 | 1.573 | 0.054 | 0.902 | 0.079 | 0.755 | 0.029 | 1.000 | 0.060 |
| | 1975-1979 | 1.792 | 0.177 | 0.882 | 0.157 | 0.628 | 0.109 | 1.000 | 0.148 |
| | 1980 | 2.403 | 0.278 | 0.649 | 0.061 | 0.621 | 0.076 | 1.000 | 0.110 |
| | 1981 | 3.724 | 1.325 | 0.0 | 0.792 | 0.853 | 0.659 | 1.000 | 0.865 |
| | 1982 | 3.854 | 2.041 | 0.0 | 1.152 | 0.755 | 1.010 | 1.000 | 1.296 |
| | 1983 | 3.865 | 2.030 | 0.0 | 1.153 | 0.746 | 1.007 | 1.000 | 1.294 |
| | 1984 | 3.959 | 2.285 | 0.0 | 1.351 | 0.675 | 1.163 | 1.000 | 1.492 |
| | 1985-1986 | 3.946 | 2.124 | 0.0 | 1.254 | 0.686 | 1.081 | 1.000 | 1.386 |
| | 1987-1989 | 3.941 | 2.009 | 0.0 | 1.186 | 0.689 | 1.014 | 1.000 | 1.308 |
| | 1990+ | 3.935 | 1.940 | 0.0 | 1.144 | 0.694 | 0.979 | 1.000 | 1.263 |
| NOx | Pre-1968 | 1.121 | 0.009 | 0.785 | 0.001 | 1.319 | -0.009 | 1.000 | 0.0 |
| | 1968-1972 | 1.199 | -0.004 | 0.793 | -0.002 | 1.245 | 0.006 | 1.000 | 0.0 |
| | 1973-1974 | 1.262 | 0.022 | 0.770 | 0.004 | 1.242 | 0.027 | 1.000 | 0.014 |
| | 1975-1976 | 1.297 | 0.012 | 0.781 | 0.004 | 1.194 | 0.016 | 1.000 | 0.009 |
| | 1977-1979 | 1.371 | 0.040 | 0.766 | 0.046 | 1.166 | 0.063 | 1.000 | 0.049 |
| | 1980 | 1.313 | 0.047 | 0.810 | 0.034 | 1.125 | 0.054 | 1.000 | 0.042 |
| | 1981 | 1.752 | 0.129 | 0.737 | 0.123 | 0.935 | 0.173 | 1.000 | 0.138 |
| | 1982 | 1.652 | 0.121 | 0.768 | 0.115 | 0.951 | 0.162 | 1.000 | 0.129 |
| | 1983 | 1.725 | 0.137 | 0.728 | 0.129 | 0.973 | 0.183 | 1.000 | 0.145 |
| | 1984 | 1.817 | 0.167 | 0.707 | 0.148 | 0.942 | 0.219 | 1.000 | 0.172 |
| | 1985-1986 | 1.818 | 0.167 | 0.707 | 0.148 | 0.942 | 0.219 | 1.000 | 0.172 |
| | 1987-1989 | 1.830 | 0.169 | 0.703 | 0.149 | 0.939 | 0.222 | 1.000 | 0.173 |
| | 1990+ | 1.830 | 0.169 | 0.704 | 0.149 | 0.939 | 0.222 | 1.000 | 0.173 |

NOTE : The fractions given in this table are used in the calculation of the operating-mode/ temperature correction factor (OMTCF).

WHERE : OMTCF = ((TERM1 + TERM2 + TERM3)/DENOM)
TERM1 = W *TCF(1)*(B1+D1*M)
TERM2 = (1-W-X)*TCF(2)*(B2+D2*M)
TERM3 = X *TCF(3)*(B3+D3*M)
DENOM = BO + DO*M
W = Fraction of VMT in the cold start mode
X = Fraction of VMT in the hot start mode
TCF(b) = Temperature correction factor for pollutant, model year; for test segment b
M = Cumulative mileage / 10,000

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## TABLE 2.1.8A

## AIR CONDITIONING CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED VEHICLES

* ACCF= U*V*(A + B*(T-75) -1) + 1

| Model Years | HC | | CO | | NOx | |
|---|---|---|---|---|---|---|
| | A | B | A | B | A | B |
| Pre-1975 | 0.1023E+01 | 0.3344E-02 | 0.1202E+01 | 0.1808E-02 | 0.1299E+01 | 0.5643E-04 |
| 1975+ | 0.1000E+01 | 0.3512E-02 | 0.1130E+01 | 0.1528E-02 | 0.1221E+01 | 0.4262E-03 |

* WHERE :

ACCF = Air Conditioning Correction Factor
V = Fraction of vehicles which are equipped with AC given in Table 2.1.8B
U = Fraction of vehicles with AC that are using it = (DI-DILO)/(DIHI-DI), 0<=U<=1
DI = Discomfort index = (DB+WB)*.4+15
DILO = The highest discomfort index where no AC is used
DIHI = The lowest discomfort index where all vehicles with AC use it
DB = Dry bulb temperature (Fahrenheit)
WB = Wet bulb temperature (Fahrenheit)
T = Ambient temperature (Fahrenheit)

## TABLE 2.1.8B

## ESTIMATED FRACTION OF HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED VEHICLES EQUIPPED WITH AIR CONDITIONING

| Model Years | Fraction Equipped With Air Conditioning |
|---|---|
| Pre-1962 | 0.07 |
| 1962-1964 | 0.14 |
| 1965-1966 | 0.24 |
| 1967-1968 | 0.37 |
| 1969-1971 | 0.51 |
| 1972-1976 | 0.61 |
| 1977+ | 0.72 |

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## TABLE 2.1.9

## EXTRA LOAD CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED VEHICLES

* XLCF = (XLC-1)*U + 1

| Model Years | Coefficients (XLC) HC | CO | NOx |
|---|---|---|---|
| Pre-1968 | 1.0786 | 1.2765 | 0.9535 |
| 1968-1969 | 1.0495 | 1.1384 | 1.0313 |
| 1970-1971 | 1.0852 | 1.2478 | 1.0313 |
| 1972 | 1.0556 | 1.1347 | 1.0313 |
| 1973-1974 | 1.0556 | 1.1347 | 1.0753 |
| 1975+ | 1.0455 | 1.3058 | 1.0719 |

* WHERE :

XLCF = Extra load correction factor
U = Fraction of VMT with an extra load
XLC = Correction factor coefficient

## TABLE 2.1.10

## TRAILER TOWING CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED VEHICLES

* TTCF = (TTC-1)*U + 1

| Model Years | Coefficients (TTC) HC | CO | NOx |
|---|---|---|---|
| Pre-1968 | 1.2614 | 1.9327 | 1.1184 |
| 1968-1969 | 1.2762 | 1.8940 | 1.1384 |
| 1970-1971 | 1.4598 | 2.4753 | 1.1384 |
| 1972 | 1.7288 | 2.1414 | 1.1384 |
| 1973-1974 | 1.7288 | 2.1414 | 1.2170 |
| 1975+ | 1.5909 | 3.9722 | 1.3875 |

* WHERE :

TTCF = Trailer towing correction factor
U = Fraction of VMT towing a trailer
TTC = Correction factor coefficient

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## TABLE 2.2.1A

## EXHAUST EMISSION RATES FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS I (RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Mile) | Deterioration Rate (Gm/Mi/10K Mi) | 50,000 Mile Emission Level (Grams/Mile) |
|---|---|---|---|---|
| HC | Pre-1968 | 9.35 | 0.18 | 10.25 |
| | 1968-1969 | 5.60 | 0.25 | 6.85 |
| | 1970-1971 | 4.58 | 0.37 | 6.43 |
| | 1972-1974 | 4.58 | 0.17 | 5.43 |
| | 1975-1976 | 3.40 | 0.27 | 4.75 |
| | 1977 | 1.60 | 0.27 | 2.95 |
| | 1978 | 3.53 | 0.27 | 4.88 |
| | 1979-1980 | 1.81 | 0.27 | 3.16 |
| | 1981 | 1.81 | 0.19 | 2.76 |
| | 1982-1983 | 1.08 | 0.19 | 2.03 |
| | 1984 | 0.72 | 0.13 | 1.37 |
| | 1985-1986 | 0.55 | 0.07 | 0.90 |
| | 1987+ | 0.62 | 0.07 | 0.97 |
| CO | Pre-1968 | 117.70 | 2.25 | 128.95 |
| | 1968-1969 | 85.54 | 2.25 | 96.79 |
| | 1970-1971 | 79.64 | 3.13 | 95.29 |
| | 1972-1974 | 75.63 | 2.44 | 87.83 |
| | 1975-1976 | 58.01 | 2.59 | 70.96 |
| | 1977 | 22.86 | 2.59 | 35.81 |
| | 1978 | 53.57 | 2.59 | 66.52 |
| | 1979-1980 | 29.83 | 2.59 | 42.78 |
| | 1981 | 29.83 | 1.13 | 35.48 |
| | 1982-1983 | 19.75 | 1.13 | 25.40 |
| | 1984 | 12.95 | 0.98 | 17.85 |
| | 1985-1986 | 8.88 | 0.49 | 11.33 |
| | 1987+ | 7.74 | 1.56 | 15.54 |
| NOx | Pre-1968 | 1.96 | 0.0 | 1.96 |
| | 1968-1972 | 2.91 | 0.0 | 2.91 |
| | 1973-1974 | 1.91 | 0.04 | 2.11 |
| | 1975-1976 | 1.88 | 0.03 | 2.03 |
| | 1977 | 2.25 | 0.03 | 2.40 |
| | 1978 | 1.88 | 0.03 | 2.03 |
| | 1979-1980 | 1.02 | 0.09 | 1.47 |
| | 1981 | 1.02 | 0.09 | 1.47 |
| | 1982-1983 | 1.74 | 0.09 | 2.19 |
| | 1984 | 1.74 | 0.09 | 2.19 |
| | 1985-1986 | 1.74 | 0.04 | 1.94 |
| | 1987+ | 0.86 | 0.04 | 1.06 |

* WHERE :
BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

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## TABLE 2.2.1B

## EXHAUST EMISSION RATES FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS I AT VARIOUS MILEAGE INTERVALS (RATES INCLUDE TAMPERING)

| Pol | Model Years | Emission Rate (Grams/Mile) 0K | 20K | 40K | 60K | 80K | 100K | 120K | 140K |
|---|---|---|---|---|---|---|---|---|---|
| HC | Pre-1968 | 9.35 | 9.71 | 10.07 | 10.43 | 10.79 | 11.14 | 11.50 | 11.86 |
| | 1968-1969 | 5.60 | 6.11 | 6.62 | 7.13 | 7.64 | 8.15 | 8.65 | 9.16 |
| | 1970-1971 | 4.58 | 5.32 | 6.06 | 6.80 | 7.54 | 8.28 | 9.02 | 9.77 |
| | 1972 | 4.59 | 4.93 | 5.28 | 5.62 | 5.97 | 6.32 | 6.66 | 7.01 |
| | 1973-1974 | 4.60 | 4.96 | 5.32 | 5.68 | 6.04 | 6.40 | 6.76 | 7.12 |
| | 1975 | 3.83 | 4.53 | 5.21 | 5.90 | 6.58 | 7.27 | 7.95 | 8.64 |
| | 1976 | 3.89 | 4.60 | 5.31 | 6.01 | 6.71 | 7.41 | 8.11 | 8.81 |
| | 1977 | 2.06 | 2.75 | 3.44 | 4.13 | 4.81 | 5.50 | 6.19 | 6.87 |
| | 1978 | 3.99 | 4.69 | 5.38 | 6.07 | 6.76 | 7.45 | 8.14 | 8.83 |
| | 1979-1980 | 2.30 | 3.01 | 3.71 | 4.42 | 5.12 | 5.82 | 6.53 | 7.23 |
| | 1981 | 2.40 | 2.97 | 3.54 | 4.11 | 4.68 | 5.24 | 5.81 | 6.38 |
| | 1982 | 1.63 | 2.19 | 2.74 | 3.30 | 3.85 | 4.41 | 4.96 | 5.52 |
| | 1983 | 1.61 | 2.16 | 2.70 | 3.25 | 3.80 | 4.34 | 4.89 | 5.44 |
| | 1984 | 1.22 | 1.62 | 2.02 | 2.42 | 2.83 | 3.23 | 3.63 | 4.03 |
| | 1985-1986 | 1.05 | 1.33 | 1.62 | 1.91 | 2.19 | 2.48 | 2.77 | 3.05 |
| | 1987+ | 1.01 | 1.26 | 1.52 | 1.78 | 2.03 | 2.29 | 2.55 | 2.80 |
| CO | Pre-1968 | 117.68 | 122.12 | 126.56 | 131.00 | 135.45 | 139.89 | 144.34 | 148.79 |
| | 1968-1969 | 85.61 | 90.11 | 94.62 | 99.13 | 103.64 | 108.16 | 112.68 | 117.20 |
| | 1970-1971 | 79.72 | 86.06 | 92.40 | 98.74 | 105.08 | 111.42 | 117.76 | 124.10 |
| | 1972 | 75.79 | 80.86 | 85.93 | 90.99 | 96.06 | 101.12 | 106.19 | 111.25 |
| | 1973-1974 | 76.09 | 81.48 | 86.87 | 92.27 | 97.66 | 103.05 | 108.43 | 113.82 |
| | 1975 | 64.07 | 71.25 | 78.37 | 85.44 | 92.48 | 99.51 | 106.53 | 113.54 |
| | 1976 | 64.61 | 71.94 | 79.20 | 86.42 | 93.61 | 100.79 | 107.95 | 115.10 |
| | 1977 | 27.90 | 34.87 | 41.83 | 48.80 | 55.76 | 62.72 | 69.68 | 76.64 |
| | 1978 | 59.73 | 66.88 | 73.96 | 81.01 | 88.03 | 95.03 | 102.03 | 109.01 |
| | 1979-1980 | 35.39 | 42.65 | 49.89 | 57.13 | 64.36 | 71.58 | 78.80 | 86.02 |
| | 1981 | 36.22 | 40.60 | 44.97 | 49.31 | 53.63 | 57.95 | 62.26 | 66.56 |
| | 1982 | 25.45 | 29.66 | 33.86 | 38.06 | 42.24 | 46.42 | 50.60 | 54.77 |
| | 1983 | 25.24 | 29.37 | 33.49 | 37.61 | 41.71 | 45.81 | 49.91 | 54.00 |
| | 1984 | 17.69 | 21.23 | 24.79 | 28.35 | 31.92 | 35.48 | 39.05 | 42.61 |
| | 1985-1986 | 13.56 | 16.12 | 18.69 | 21.27 | 23.85 | 26.43 | 29.01 | 31.59 |
| | 1987+ | 11.33 | 15.68 | 20.04 | 24.41 | 28.77 | 33.13 | 37.49 | 41.85 |
| NOx | Pre-1968 | 1.96 | 1.96 | 1.96 | 1.96 | 1.96 | 1.96 | 1.96 | 1.96 |
| | 1968-1972 | 2.91 | 2.91 | 2.91 | 2.91 | 2.90 | 2.90 | 2.90 | 2.90 |
| | 1973 | 1.96 | 2.08 | 2.20 | 2.33 | 2.45 | 2.57 | 2.69 | 2.82 |
| | 1974 | 1.97 | 2.09 | 2.22 | 2.35 | 2.48 | 2.60 | 2.73 | 2.86 |
| | 1975-1976 | 2.03 | 2.21 | 2.39 | 2.57 | 2.75 | 2.93 | 3.11 | 3.29 |
| | 1977 | 2.40 | 2.58 | 2.76 | 2.94 | 3.11 | 3.29 | 3.47 | 3.64 |
| | 1978 | 2.03 | 2.21 | 2.39 | 2.57 | 2.75 | 2.93 | 3.11 | 3.29 |
| | 1979-1980 | 1.19 | 1.52 | 1.85 | 2.18 | 2.51 | 2.84 | 3.17 | 3.50 |
| | 1981 | 1.19 | 1.52 | 1.85 | 2.18 | 2.51 | 2.84 | 3.17 | 3.49 |
| | 1982 | 1.92 | 2.25 | 2.58 | 2.91 | 3.24 | 3.56 | 3.89 | 4.22 |
| | 1983 | 1.93 | 2.26 | 2.59 | 2.93 | 3.26 | 3.59 | 3.92 | 4.25 |
| | 1984 | 1.95 | 2.28 | 2.62 | 2.95 | 3.29 | 3.62 | 3.95 | 4.29 |
| | 1985-1986 | 1.95 | 2.18 | 2.42 | 2.65 | 2.89 | 3.12 | 3.36 | 3.60 |
| | 1987+ | 1.19 | 1.39 | 1.59 | 1.80 | 2.00 | 2.20 | 2.41 | 2.61 |

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## TABLE 2.2.1C

## CRANKCASE AND EVAPORATIVE HYDROCARBON EMISSIONS FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS I (RATES REFLECT ZERO TAMPERING)

** CCEV = (HSK * TPD + DNL)/MPD + CC

| Model Years | SHED Hot Soak Emissions (Gm/Trip) | Trips* Per Day | SHED Diurnal Emissions (Gm/Day) | Miles* Per Day | Crankcase Emissions (Gm/Mile) | Total Crankcase and Evap. Emissions (Gm/Mile) |
|---|---|---|---|---|---|---|
| Pre-1963 | 29.18 | 3.05 | 62.38 | 26.30 | 5.29 | 11.05 |
| 1963-1967 | 29.18 | 3.05 | 62.38 | 26.30 | 1.03 | 6.79 |
| 1968-1970 | 29.18 | 3.05 | 62.38 | 26.30 | 0.0 | 5.76 |
| 1971 | 20.99 | 3.05 | 50.15 | 26.30 | 0.0 | 4.34 |
| 1972-1976 | 20.96 | 3.05 | 44.93 | 26.30 | 0.0 | 4.14 |
| 1977 | 12.32 | 3.05 | 23.53 | 26.30 | 0.0 | 2.32 |
| 1978-1981 | 10.31 | 3.05 | 24.11 | 26.30 | 0.0 | 2.11 |
| 1982-1983 | 10.31 | 3.05 | 12.10 | 26.30 | 0.0 | 1.66 |
| 1984 | 4.67 | 3.05 | 12.10 | 26.30 | 0.0 | 1.00 |
| 1985 | 4.16 | 3.05 | 12.10 | 26.30 | 0.0 | 0.94 |
| 1986 | 3.65 | 3.05 | 12.10 | 26.30 | 0.0 | 0.88 |
| 1987 | 3.21 | 3.05 | 12.10 | 26.30 | 0.0 | 0.83 |
| 1988-1989 | 2.67 | 3.05 | 12.10 | 26.30 | 0.0 | 0.77 |
| 1990+ | 2.37 | 3.05 | 12.10 | 26.30 | 0.0 | 0.73 |

* Default information that may be altered by the MOBILE3 user with information about the local area.

** WHERE :

CCEV = Total untampered crankcase & evaporative HC emissions (Gm/Mile)
HSK = Hot soak emissions (Gm/Trip)
TPD = Trips per day
DNL = Diurnal emissions (Gm/Day)
MPD = Miles per day
CC = Crankcase emissions (Gm/Mile)

DATE : MAY 25, 1985

## TABLE 2.2.1D

## TOTAL CRANKCASE AND EVAPORATIVE HC EMISSIONS FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS I AT VARIOUS MILEAGE INTERVALS (RATES INCLUDE TAMPERING)

| Model Years | Emission Rate (Grams/Mile)<br>0K | 20K | 40K | 60K | 80K | 100K | 120K | 140K |
|---|---|---|---|---|---|---|---|---|
| Pre-1963 | 11.05 | 11.05 | 11.05 | 11.05 | 11.05 | 11.05 | 11.05 | 11.05 |
| 1963-1967 | 6.79 | 6.79 | 6.79 | 6.79 | 6.79 | 6.79 | 6.79 | 6.79 |
| 1968-1970 | 5.87 | 5.89 | 5.91 | 5.93 | 5.95 | 5.96 | 5.98 | 6.00 |
| 1971 | 4.50 | 4.53 | 4.55 | 4.58 | 4.61 | 4.63 | 4.66 | 4.69 |
| 1972-1974 | 4.35 | 4.38 | 4.42 | 4.45 | 4.49 | 4.52 | 4.56 | 4.59 |
| 1975-1976 | 4.34 | 4.38 | 4.41 | 4.45 | 4.48 | 4.52 | 4.55 | 4.59 |
| 1977 | 2.53 | 2.56 | 2.60 | 2.63 | 2.67 | 2.70 | 2.74 | 2.77 |
| 1978-1979 | 2.28 | 2.31 | 2.34 | 2.37 | 2.40 | 2.43 | 2.46 | 2.49 |
| 1980 | 2.27 | 2.30 | 2.32 | 2.35 | 2.38 | 2.40 | 2.43 | 2.46 |
| 1981 | 2.27 | 2.29 | 2.32 | 2.35 | 2.37 | 2.40 | 2.43 | 2.45 |
| 1982 | 1.81 | 1.84 | 1.86 | 1.89 | 1.92 | 1.94 | 1.97 | 2.00 |
| 1983 | 1.81 | 1.83 | 1.86 | 1.88 | 1.91 | 1.93 | 1.96 | 1.98 |
| 1984 | 1.14 | 1.17 | 1.19 | 1.21 | 1.24 | 1.26 | 1.29 | 1.31 |
| 1985 | 1.07 | 1.10 | 1.12 | 1.14 | 1.16 | 1.18 | 1.21 | 1.23 |
| 1986 | 1.01 | 1.03 | 1.05 | 1.07 | 1.09 | 1.11 | 1.13 | 1.15 |
| 1987 | 0.95 | 0.97 | 0.98 | 1.00 | 1.02 | 1.04 | 1.06 | 1.08 |
| 1988-1989 | 0.87 | 0.89 | 0.91 | 0.93 | 0.94 | 0.96 | 0.98 | 0.99 |
| 1990+ | 0.83 | 0.85 | 0.87 | 0.88 | 0.90 | 0.91 | 0.93 | 0.95 |

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TABLE 2.2.2A

DATE : MAY 25, 1985

## EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
## LIGHT DUTY GASOLINE POWERED TRUCKS I
## TOTAL HC (INCLUDES EVAP & CRANKCASE)

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 23.7 | 1962 | 23.7 | 1963 | 19.5 | 1964 | 19.5 | 1965 | 19.5 | 1966 | 19.5 | 1967 | 19.5 | 1968 | 16.2 | 1969 | 16.2 | 1970 | 17.5 | 1971 | 16.1 | 1972 | 12.3 |
| 1962 | 23.6 | 1963 | 19.4 | 1964 | 19.4 | 1965 | 19.4 | 1966 | 19.4 | 1967 | 19.4 | 1968 | 16.1 | 1969 | 16.1 | 1970 | 17.3 | 1971 | 15.9 | 1972 | 12.3 | 1973 | 12.3 |
| 1963 | 19.3 | 1964 | 19.3 | 1965 | 19.3 | 1966 | 19.3 | 1967 | 19.3 | 1968 | 16.0 | 1969 | 16.0 | 1970 | 17.1 | 1971 | 15.7 | 1972 | 12.2 | 1973 | 12.2 | 1974 | 12.2 |
| 1964 | 19.2 | 1965 | 19.2 | 1966 | 19.2 | 1967 | 19.2 | 1968 | 15.8 | 1969 | 15.8 | 1970 | 16.9 | 1971 | 15.5 | 1972 | 12.1 | 1973 | 12.1 | 1974 | 12.1 | 1975 | 12.6 |
| 1965 | 19.1 | 1966 | 19.1 | 1967 | 19.1 | 1968 | 15.7 | 1969 | 15.7 | 1970 | 16.7 | 1971 | 15.3 | 1972 | 12.0 | 1973 | 12.0 | 1974 | 12.0 | 1975 | 12.4 | 1976 | 12.4 |
| 1966 | 19.0 | 1967 | 19.0 | 1968 | 15.5 | 1969 | 15.5 | 1970 | 16.5 | 1971 | 15.1 | 1972 | 11.9 | 1973 | 11.9 | 1974 | 11.9 | 1975 | 12.2 | 1976 | 12.2 | 1977 | 8.6 |
| 1967 | 18.8 | 1968 | 15.4 | 1969 | 15.4 | 1970 | 16.2 | 1971 | 14.8 | 1972 | 11.8 | 1973 | 11.8 | 1974 | 11.8 | 1975 | 12.1 | 1976 | 12.1 | 1977 | 8.4 | 1978 | 10.1 |
| 1968 | 15.2 | 1969 | 15.2 | 1970 | 16.0 | 1971 | 14.6 | 1972 | 11.6 | 1973 | 11.6 | 1974 | 11.6 | 1975 | 11.9 | 1976 | 11.9 | 1977 | 8.2 | 1978 | 9.9 | 1979 | 8.2 |
| 1969 | 15.0 | 1970 | 15.7 | 1971 | 14.3 | 1972 | 11.5 | 1973 | 11.5 | 1974 | 11.5 | 1975 | 11.6 | 1976 | 11.6 | 1977 | 8.0 | 1978 | 9.7 | 1979 | 8.0 | 1980 | 8.0 |
| 1970 | 15.4 | 1971 | 14.0 | 1972 | 11.4 | 1973 | 11.4 | 1974 | 11.4 | 1975 | 11.4 | 1976 | 11.4 | 1977 | 7.8 | 1978 | 9.5 | 1979 | 7.8 | 1980 | 7.8 | 1981 | 6.7 |
| 1971 | 13.6 | 1972 | 11.2 | 1973 | 11.2 | 1974 | 11.2 | 1975 | 11.2 | 1976 | 11.2 | 1977 | 7.5 | 1978 | 9.3 | 1979 | 7.5 | 1980 | 7.5 | 1981 | 6.6 | 1982 | 5.3 |
| 1972 | 11.0 | 1973 | 11.0 | 1974 | 11.0 | 1975 | 10.9 | 1976 | 10.9 | 1977 | 7.3 | 1978 | 9.0 | 1979 | 7.3 | 1980 | 7.3 | 1981 | 6.4 | 1982 | 5.1 | 1983 | 5.1 |
| 1973 | 10.9 | 1974 | 10.9 | 1975 | 10.6 | 1976 | 10.6 | 1977 | 7.0 | 1978 | 8.7 | 1979 | 7.0 | 1980 | 7.0 | 1981 | 6.2 | 1982 | 4.9 | 1983 | 4.9 | 1984 | 3.3 |
| 1974 | 10.7 | 1975 | 10.3 | 1976 | 10.3 | 1977 | 6.7 | 1978 | 8.4 | 1979 | 6.7 | 1980 | 6.7 | 1981 | 6.0 | 1982 | 4.7 | 1983 | 4.7 | 1984 | 3.2 | 1985 | 2.4 |
| 1975 | 10.0 | 1976 | 10.0 | 1977 | 6.4 | 1978 | 8.1 | 1979 | 6.3 | 1980 | 6.3 | 1981 | 5.7 | 1982 | 4.5 | 1983 | 4.5 | 1984 | 3.0 | 1985 | 2.3 | 1986 | 2.2 |
| 1976 | 9.6 | 1977 | 6.0 | 1978 | 7.7 | 1979 | 6.0 | 1980 | 6.0 | 1981 | 5.5 | 1982 | 4.2 | 1983 | 4.2 | 1984 | 2.8 | 1985 | 2.2 | 1986 | 2.1 | 1987 | 2.2 |
| 1977 | 5.6 | 1978 | 7.3 | 1979 | 5.6 | 1980 | 5.6 | 1981 | 5.2 | 1982 | 3.9 | 1983 | 3.9 | 1984 | 2.6 | 1985 | 2.1 | 1986 | 2.0 | 1987 | 2.1 | 1988 | 2.0 |
| 1978 | 6.9 | 1979 | 5.2 | 1980 | 5.2 | 1981 | 4.9 | 1982 | 3.7 | 1983 | 3.7 | 1984 | 2.4 | 1985 | 2.0 | 1986 | 1.9 | 1987 | 1.9 | 1988 | 1.9 | 1989 | 1.9 |
| 1979 | 4.7 | 1980 | 4.7 | 1981 | 4.6 | 1982 | 3.3 | 1983 | 3.3 | 1984 | 2.2 | 1985 | 1.9 | 1986 | 1.8 | 1987 | 1.8 | 1988 | 1.8 | 1989 | 1.8 | 1990 | 1.7 |
| 1980 | 4.4 | 1981 | 4.4 | 1982 | 3.1 | 1983 | 3.1 | 1984 | 2.1 | 1985 | 1.8 | 1986 | 1.7 | 1987 | 1.8 | 1988 | 1.7 | 1989 | 1.7 | 1990 | 1.7 | 1991 | 1.7 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 12.3 | 1974 | 12.3 | 1975 | 13.0 | 1976 | 13.0 | 1977 | 9.3 | 1978 | 11.0 | 1979 | 9.3 | 1980 | 9.3 | 1981 | 7.8 | 1982 | 6.6 | 1983 | 6.6 | 1984 | 4.4 |
| 1974 | 12.3 | 1975 | 12.8 | 1976 | 12.8 | 1977 | 9.2 | 1978 | 10.9 | 1979 | 9.2 | 1980 | 9.2 | 1981 | 7.7 | 1982 | 6.5 | 1983 | 6.5 | 1984 | 4.4 | 1985 | 3.0 |
| 1975 | 12.7 | 1976 | 12.7 | 1977 | 9.1 | 1978 | 10.8 | 1979 | 9.0 | 1980 | 9.0 | 1981 | 7.6 | 1982 | 6.4 | 1983 | 6.4 | 1984 | 4.3 | 1985 | 3.0 | 1986 | 2.9 |
| 1976 | 12.6 | 1977 | 8.9 | 1978 | 10.6 | 1979 | 8.9 | 1980 | 8.9 | 1981 | 7.5 | 1982 | 6.3 | 1983 | 6.3 | 1984 | 4.2 | 1985 | 3.0 | 1986 | 2.9 | 1987 | 2.9 |
| 1977 | 8.8 | 1978 | 10.5 | 1979 | 8.7 | 1980 | 8.7 | 1981 | 7.4 | 1982 | 6.2 | 1983 | 6.2 | 1984 | 4.2 | 1985 | 2.9 | 1986 | 2.9 | 1987 | 2.9 | 1988 | 2.8 |
| 1978 | 10.3 | 1979 | 8.6 | 1980 | 8.6 | 1981 | 7.3 | 1982 | 6.0 | 1983 | 6.0 | 1984 | 4.1 | 1985 | 2.9 | 1986 | 2.8 | 1987 | 2.8 | 1988 | 2.8 | 1989 | 2.8 |
| 1979 | 8.4 | 1980 | 8.4 | 1981 | 7.2 | 1982 | 5.9 | 1983 | 5.9 | 1984 | 4.0 | 1985 | 2.8 | 1986 | 2.8 | 1987 | 2.8 | 1988 | 2.7 | 1989 | 2.7 | 1990 | 2.7 |
| 1980 | 8.2 | 1981 | 7.1 | 1982 | 5.8 | 1983 | 5.8 | 1984 | 3.9 | 1985 | 2.8 | 1986 | 2.7 | 1987 | 2.7 | 1988 | 2.7 | 1989 | 2.7 | 1990 | 2.6 | 1991 | 2.6 |
| 1981 | 6.9 | 1982 | 5.6 | 1983 | 5.6 | 1984 | 3.8 | 1985 | 2.7 | 1986 | 2.7 | 1987 | 2.7 | 1988 | 2.6 | 1989 | 2.6 | 1990 | 2.6 | 1991 | 2.6 | 1992 | 2.6 |
| 1982 | 5.5 | 1983 | 5.5 | 1984 | 3.7 | 1985 | 2.7 | 1986 | 2.6 | 1987 | 2.6 | 1988 | 2.6 | 1989 | 2.6 | 1990 | 2.5 | 1991 | 2.5 | 1992 | 2.5 | 1993 | 2.5 |
| 1983 | 5.3 | 1984 | 3.6 | 1985 | 2.6 | 1986 | 2.5 | 1987 | 2.5 | 1988 | 2.5 | 1989 | 2.5 | 1990 | 2.5 | 1991 | 2.5 | 1992 | 2.5 | 1993 | 2.5 | 1994 | 2.5 |
| 1984 | 3.4 | 1985 | 2.5 | 1986 | 2.5 | 1987 | 2.5 | 1988 | 2.4 | 1989 | 2.4 | 1990 | 2.4 | 1991 | 2.4 | 1992 | 2.4 | 1993 | 2.4 | 1994 | 2.4 | 1995 | 2.4 |
| 1985 | 2.5 | 1986 | 2.4 | 1987 | 2.4 | 1988 | 2.3 | 1989 | 2.3 | 1990 | 2.3 | 1991 | 2.3 | 1992 | 2.3 | 1993 | 2.3 | 1994 | 2.3 | 1995 | 2.3 | 1996 | 2.3 |
| 1986 | 2.3 | 1987 | 2.3 | 1988 | 2.3 | 1989 | 2.3 | 1990 | 2.2 | 1991 | 2.2 | 1992 | 2.2 | 1993 | 2.2 | 1994 | 2.2 | 1995 | 2.2 | 1996 | 2.2 | 1997 | 2.2 |
| 1987 | 2.2 | 1988 | 2.2 | 1989 | 2.2 | 1990 | 2.1 | 1991 | 2.1 | 1992 | 2.1 | 1993 | 2.1 | 1994 | 2.1 | 1995 | 2.1 | 1996 | 2.1 | 1997 | 2.1 | 1998 | 2.1 |
| 1988 | 2.1 | 1989 | 2.1 | 1990 | 2.1 | 1991 | 2.1 | 1992 | 2.1 | 1993 | 2.1 | 1994 | 2.1 | 1995 | 2.1 | 1996 | 2.1 | 1997 | 2.1 | 1998 | 2.1 | 1999 | 2.1 |
| 1989 | 2.0 | 1990 | 2.0 | 1991 | 2.0 | 1992 | 2.0 | 1993 | 2.0 | 1994 | 2.0 | 1995 | 2.0 | 1996 | 2.0 | 1997 | 2.0 | 1998 | 2.0 | 1999 | 2.0 | 2000 | 2.0 |
| 1990 | 1.8 | 1991 | 1.8 | 1992 | 1.8 | 1993 | 1.8 | 1994 | 1.8 | 1995 | 1.8 | 1996 | 1.8 | 1997 | 1.8 | 1998 | 1.8 | 1999 | 1.8 | 2000 | 1.8 | 2001 | 1.8 |
| 1991 | 1.7 | 1992 | 1.7 | 1993 | 1.7 | 1994 | 1.7 | 1995 | 1.7 | 1996 | 1.7 | 1997 | 1.7 | 1998 | 1.7 | 1999 | 1.7 | 2000 | 1.7 | 2001 | 1.7 | 2002 | 1.7 |
| 1992 | 1.7 | 1993 | 1.7 | 1994 | 1.7 | 1995 | 1.7 | 1996 | 1.7 | 1997 | 1.7 | 1998 | 1.7 | 1999 | 1.7 | 2000 | 1.7 | 2001 | 1.7 | 2002 | 1.7 | 2003 | 1.7 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.2.4.

TABLE 2.2.2B

DATE : MAY 25, 1985

## EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS I CO

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 157.7 | 1962 | 157.7 | 1963 | 157.7 | 1964 | 157.7 | 1965 | 157.7 | 1966 | 157.7 | 1967 | 157.7 | 1968 | 125.7 | 1969 | 125.7 | 1970 | 135.7 | 1971 | 135.7 | 1972 | 119.3 |
| 1962 | 156.7 | 1963 | 156.7 | 1964 | 156.7 | 1965 | 156.7 | 1966 | 156.7 | 1967 | 156.7 | 1968 | 124.7 | 1969 | 124.7 | 1970 | 134.3 | 1971 | 134.3 | 1972 | 118.2 | 1973 | 118.2 |
| 1963 | 155.6 | 1964 | 155.6 | 1965 | 155.6 | 1966 | 155.6 | 1967 | 155.6 | 1968 | 123.6 | 1969 | 123.6 | 1970 | 132.8 | 1971 | 132.8 | 1972 | 117.0 | 1973 | 117.0 | 1974 | 117.0 |
| 1964 | 154.4 | 1965 | 154.4 | 1966 | 154.4 | 1967 | 154.4 | 1968 | 122.4 | 1969 | 122.4 | 1970 | 131.1 | 1971 | 131.1 | 1972 | 115.7 | 1973 | 115.7 | 1974 | 115.7 | 1975 | 100.6 |
| 1965 | 153.1 | 1966 | 153.1 | 1967 | 153.1 | 1968 | 121.1 | 1969 | 121.1 | 1970 | 129.3 | 1971 | 129.3 | 1972 | 114.3 | 1973 | 114.3 | 1974 | 114.3 | 1975 | 99.2 | 1976 | 99.2 |
| 1966 | 151.7 | 1967 | 151.7 | 1968 | 119.7 | 1969 | 119.7 | 1970 | 127.4 | 1971 | 127.4 | 1972 | 112.8 | 1973 | 112.8 | 1974 | 112.8 | 1975 | 97.6 | 1976 | 97.6 | 1977 | 62.6 |
| 1967 | 150.3 | 1968 | 118.2 | 1969 | 118.2 | 1970 | 125.3 | 1971 | 125.3 | 1972 | 111.2 | 1973 | 111.2 | 1974 | 111.2 | 1975 | 95.9 | 1976 | 95.9 | 1977 | 60.9 | 1978 | 91.4 |
| 1968 | 116.6 | 1969 | 116.6 | 1970 | 123.1 | 1971 | 123.1 | 1972 | 109.4 | 1973 | 109.4 | 1974 | 109.4 | 1975 | 94.0 | 1976 | 94.0 | 1977 | 59.0 | 1978 | 89.6 | 1979 | 66.0 |
| 1969 | 114.9 | 1970 | 120.7 | 1971 | 120.7 | 1972 | 107.6 | 1973 | 107.6 | 1974 | 107.6 | 1975 | 92.0 | 1976 | 92.0 | 1977 | 57.0 | 1978 | 87.6 | 1979 | 64.0 | 1980 | 64.0 |
| 1970 | 118.1 | 1971 | 118.1 | 1972 | 105.5 | 1973 | 105.5 | 1974 | 105.5 | 1975 | 89.9 | 1976 | 89.9 | 1977 | 54.9 | 1978 | 85.4 | 1979 | 61.8 | 1980 | 61.8 | 1981 | 43.7 |
| 1971 | 115.3 | 1972 | 103.3 | 1973 | 103.3 | 1974 | 103.3 | 1975 | 87.5 | 1976 | 87.5 | 1977 | 52.6 | 1978 | 83.1 | 1979 | 59.5 | 1980 | 59.5 | 1981 | 42.7 | 1982 | 32.7 |
| 1972 | 101.0 | 1973 | 101.0 | 1974 | 101.0 | 1975 | 85.0 | 1976 | 85.0 | 1977 | 50.1 | 1978 | 80.6 | 1979 | 57.0 | 1980 | 57.0 | 1981 | 41.6 | 1982 | 31.6 | 1983 | 31.6 |
| 1973 | 98.4 | 1974 | 98.4 | 1975 | 82.3 | 1976 | 82.3 | 1977 | 47.4 | 1978 | 77.9 | 1979 | 54.3 | 1980 | 54.3 | 1981 | 40.4 | 1982 | 30.4 | 1983 | 30.4 | 1984 | 22.2 |
| 1974 | 95.7 | 1975 | 79.4 | 1976 | 79.4 | 1977 | 44.4 | 1978 | 75.0 | 1979 | 51.4 | 1980 | 51.4 | 1981 | 39.2 | 1982 | 29.1 | 1983 | 29.1 | 1984 | 21.1 | 1985 | 12.9 |
| 1975 | 76.3 | 1976 | 76.3 | 1977 | 41.3 | 1978 | 71.9 | 1979 | 48.2 | 1980 | 48.2 | 1981 | 37.8 | 1982 | 27.8 | 1983 | 27.8 | 1984 | 19.9 | 1985 | 12.3 | 1986 | 12.3 |
| 1976 | 72.9 | 1977 | 37.9 | 1978 | 68.5 | 1979 | 44.9 | 1980 | 44.9 | 1981 | 36.3 | 1982 | 26.3 | 1983 | 26.3 | 1984 | 18.6 | 1985 | 11.7 | 1986 | 11.7 | 1987 | 16.8 |
| 1977 | 34.3 | 1978 | 64.8 | 1979 | 41.2 | 1980 | 41.2 | 1981 | 34.7 | 1982 | 24.7 | 1983 | 24.7 | 1984 | 17.2 | 1985 | 11.0 | 1986 | 11.0 | 1987 | 14.6 | 1988 | 14.6 |
| 1978 | 60.9 | 1979 | 37.3 | 1980 | 37.3 | 1981 | 33.0 | 1982 | 23.0 | 1983 | 23.0 | 1984 | 15.8 | 1985 | 10.3 | 1986 | 10.3 | 1987 | 12.3 | 1988 | 12.3 | 1989 | 12.3 |
| 1979 | 33.0 | 1980 | 33.0 | 1981 | 31.1 | 1982 | 21.1 | 1983 | 21.1 | 1984 | 14.2 | 1985 | 9.5 | 1986 | 9.5 | 1987 | 9.7 | 1988 | 9.7 | 1989 | 9.7 | 1990 | 9.7 |
| 1980 | 30.2 | 1981 | 29.9 | 1982 | 19.9 | 1983 | 19.9 | 1984 | 13.1 | 1985 | 8.9 | 1986 | 8.9 | 1987 | 8.0 | 1988 | 8.0 | 1989 | 8.0 | 1990 | 8.0 | 1991 | 8.0 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 119.3 | 1974 | 119.3 | 1975 | 104.5 | 1976 | 104.5 | 1977 | 69.5 | 1978 | 100.0 | 1979 | 76.4 | 1980 | 76.4 | 1981 | 50.1 | 1982 | 40.0 | 1983 | 40.0 | 1984 | 30.6 |
| 1974 | 118.2 | 1975 | 103.3 | 1976 | 103.3 | 1977 | 68.3 | 1978 | 98.9 | 1979 | 75.2 | 1980 | 75.2 | 1981 | 49.6 | 1982 | 39.5 | 1983 | 39.5 | 1984 | 30.1 | 1985 | 17.5 |
| 1975 | 102.0 | 1976 | 102.0 | 1977 | 67.0 | 1978 | 97.6 | 1979 | 74.0 | 1980 | 74.0 | 1981 | 49.0 | 1982 | 39.0 | 1983 | 39.0 | 1984 | 29.6 | 1985 | 17.2 | 1986 | 17.2 |
| 1976 | 100.6 | 1977 | 65.7 | 1978 | 96.2 | 1979 | 72.6 | 1980 | 72.6 | 1981 | 48.4 | 1982 | 38.4 | 1983 | 38.4 | 1984 | 29.1 | 1985 | 17.0 | 1986 | 17.0 | 1987 | 33.5 |
| 1977 | 64.2 | 1978 | 94.7 | 1979 | 71.1 | 1980 | 71.1 | 1981 | 47.8 | 1982 | 37.7 | 1983 | 37.7 | 1984 | 28.6 | 1985 | 16.7 | 1986 | 16.7 | 1987 | 32.7 | 1988 | 32.7 |
| 1978 | 93.2 | 1979 | 69.5 | 1980 | 69.5 | 1981 | 47.1 | 1982 | 37.0 | 1983 | 37.0 | 1984 | 28.0 | 1985 | 16.4 | 1986 | 16.4 | 1987 | 31.7 | 1988 | 31.7 | 1989 | 31.7 |
| 1979 | 67.8 | 1980 | 67.8 | 1981 | 46.3 | 1982 | 36.3 | 1983 | 36.3 | 1984 | 27.3 | 1985 | 16.0 | 1986 | 16.0 | 1987 | 30.7 | 1988 | 30.7 | 1989 | 30.7 | 1990 | 30.7 |
| 1980 | 66.0 | 1981 | 45.5 | 1982 | 35.5 | 1983 | 35.5 | 1984 | 26.6 | 1985 | 15.7 | 1986 | 15.7 | 1987 | 29.6 | 1988 | 29.6 | 1989 | 29.6 | 1990 | 29.6 | 1991 | 29.6 |
| 1981 | 44.6 | 1982 | 34.6 | 1983 | 34.6 | 1984 | 25.9 | 1985 | 15.3 | 1986 | 15.3 | 1987 | 28.3 | 1988 | 28.3 | 1989 | 28.3 | 1990 | 28.3 | 1991 | 28.3 | 1992 | 28.3 |
| 1982 | 33.7 | 1983 | 33.7 | 1984 | 25.0 | 1985 | 14.9 | 1986 | 14.9 | 1987 | 27.1 | 1988 | 27.1 | 1989 | 27.1 | 1990 | 27.1 | 1991 | 27.1 | 1992 | 27.1 | 1993 | 27.1 |
| 1983 | 32.7 | 1984 | 24.2 | 1985 | 14.5 | 1986 | 14.5 | 1987 | 25.7 | 1988 | 25.7 | 1989 | 25.7 | 1990 | 25.7 | 1991 | 25.7 | 1992 | 25.7 | 1993 | 25.7 | 1994 | 25.7 |
| 1984 | 23.2 | 1985 | 14.0 | 1986 | 14.0 | 1987 | 24.1 | 1988 | 24.1 | 1989 | 24.1 | 1990 | 24.1 | 1991 | 24.1 | 1992 | 24.1 | 1993 | 24.1 | 1994 | 24.1 | 1995 | 24.1 |
| 1985 | 13.5 | 1986 | 13.5 | 1987 | 22.5 | 1988 | 22.5 | 1989 | 22.5 | 1990 | 22.5 | 1991 | 22.5 | 1992 | 22.5 | 1993 | 22.5 | 1994 | 22.5 | 1995 | 22.5 | 1996 | 22.5 |
| 1986 | 12.9 | 1987 | 20.8 | 1988 | 20.8 | 1989 | 20.8 | 1990 | 20.8 | 1991 | 20.8 | 1992 | 20.8 | 1993 | 20.8 | 1994 | 20.8 | 1995 | 20.8 | 1996 | 20.8 | 1997 | 20.8 |
| 1987 | 18.9 | 1988 | 18.9 | 1989 | 18.9 | 1990 | 18.9 | 1991 | 18.9 | 1992 | 18.9 | 1993 | 18.9 | 1994 | 18.9 | 1995 | 18.9 | 1996 | 18.9 | 1997 | 18.9 | 1998 | 18.9 |
| 1988 | 16.8 | 1989 | 16.8 | 1990 | 16.8 | 1991 | 16.8 | 1992 | 16.8 | 1993 | 16.8 | 1994 | 16.8 | 1995 | 16.8 | 1996 | 16.8 | 1997 | 16.8 | 1998 | 16.8 | 1999 | 16.8 |
| 1989 | 14.6 | 1990 | 14.6 | 1991 | 14.6 | 1992 | 14.6 | 1993 | 14.6 | 1994 | 14.6 | 1995 | 14.6 | 1996 | 14.6 | 1997 | 14.6 | 1998 | 14.6 | 1999 | 14.6 | 2000 | 14.6 |
| 1990 | 12.3 | 1991 | 12.3 | 1992 | 12.3 | 1993 | 12.3 | 1994 | 12.3 | 1995 | 12.3 | 1996 | 12.3 | 1997 | 12.3 | 1998 | 12.3 | 1999 | 12.3 | 2000 | 12.3 | 2001 | 12.3 |
| 1991 | 9.7 | 1992 | 9.7 | 1993 | 9.7 | 1994 | 9.7 | 1995 | 9.7 | 1996 | 9.7 | 1997 | 9.7 | 1998 | 9.7 | 1999 | 9.7 | 2000 | 9.7 | 2001 | 9.7 | 2002 | 9.7 |
| 1992 | 8.0 | 1993 | 8.0 | 1994 | 8.0 | 1995 | 8.0 | 1996 | 8.0 | 1997 | 8.0 | 1998 | 8.0 | 1999 | 8.0 | 2000 | 8.0 | 2001 | 8.0 | 2002 | 8.0 | 2003 | 8.0 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.2.4.

TABLE 2.2.2C

DATE : MAY 25, 1985

## EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS I
## NOx

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 2.0 | 1962 | 2.0 | 1963 | 2.0 | 1964 | 2.0 | 1965 | 2.0 | 1966 | 2.0 | 1967 | 2.0 | 1968 | 2.9 | 1969 | 2.9 | 1970 | 2.9 | 1971 | 2.9 | 1972 | 2.9 |
| 1962 | 2.0 | 1963 | 2.0 | 1964 | 2.0 | 1965 | 2.0 | 1966 | 2.0 | 1967 | 2.0 | 1968 | 2.9 | 1969 | 2.9 | 1970 | 2.9 | 1971 | 2.9 | 1972 | 2.9 | 1973 | 2.6 |
| 1963 | 2.0 | 1964 | 2.0 | 1965 | 2.0 | 1966 | 2.0 | 1967 | 2.0 | 1968 | 2.9 | 1969 | 2.9 | 1970 | 2.9 | 1971 | 2.9 | 1972 | 2.9 | 1973 | 2.6 | 1974 | 2.6 |
| 1964 | 2.0 | 1965 | 2.0 | 1966 | 2.0 | 1967 | 2.0 | 1968 | 2.9 | 1969 | 2.9 | 1970 | 2.9 | 1971 | 2.9 | 1972 | 2.9 | 1973 | 2.6 | 1974 | 2.6 | 1975 | 2.4 |
| 1965 | 2.0 | 1966 | 2.0 | 1967 | 2.0 | 1968 | 2.9 | 1969 | 2.9 | 1970 | 2.9 | 1971 | 2.9 | 1972 | 2.9 | 1973 | 2.5 | 1974 | 2.5 | 1975 | 2.4 | 1976 | 2.4 |
| 1966 | 2.0 | 1967 | 2.0 | 1968 | 2.9 | 1969 | 2.9 | 1970 | 2.9 | 1971 | 2.9 | 1972 | 2.9 | 1973 | 2.5 | 1974 | 2.5 | 1975 | 2.3 | 1976 | 2.3 | 1977 | 2.7 |
| 1967 | 2.0 | 1968 | 2.9 | 1969 | 2.9 | 1970 | 2.9 | 1971 | 2.9 | 1972 | 2.9 | 1973 | 2.5 | 1974 | 2.5 | 1975 | 2.3 | 1976 | 2.3 | 1977 | 2.7 | 1978 | 2.3 |
| 1968 | 2.9 | 1969 | 2.9 | 1970 | 2.9 | 1971 | 2.9 | 1972 | 2.9 | 1973 | 2.5 | 1974 | 2.5 | 1975 | 2.3 | 1976 | 2.3 | 1977 | 2.7 | 1978 | 2.3 | 1979 | 2.3 |
| 1969 | 2.9 | 1970 | 2.9 | 1971 | 2.9 | 1972 | 2.9 | 1973 | 2.4 | 1974 | 2.4 | 1975 | 2.3 | 1976 | 2.3 | 1977 | 2.6 | 1978 | 2.3 | 1979 | 2.2 | 1980 | 2.2 |
| 1970 | 2.9 | 1971 | 2.9 | 1972 | 2.9 | 1973 | 2.4 | 1974 | 2.4 | 1975 | 2.2 | 1976 | 2.2 | 1977 | 2.6 | 1978 | 2.2 | 1979 | 2.1 | 1980 | 2.1 | 1981 | 2.1 |
| 1971 | 2.9 | 1972 | 2.9 | 1973 | 2.4 | 1974 | 2.4 | 1975 | 2.2 | 1976 | 2.2 | 1977 | 2.6 | 1978 | 2.2 | 1979 | 2.1 | 1980 | 2.1 | 1981 | 2.1 | 1982 | 2.8 |
| 1972 | 2.9 | 1973 | 2.3 | 1974 | 2.3 | 1975 | 2.2 | 1976 | 2.2 | 1977 | 2.6 | 1978 | 2.2 | 1979 | 2.0 | 1980 | 2.0 | 1981 | 2.0 | 1982 | 2.7 | 1983 | 2.7 |
| 1973 | 2.3 | 1974 | 2.3 | 1975 | 2.2 | 1976 | 2.2 | 1977 | 2.5 | 1978 | 2.2 | 1979 | 1.9 | 1980 | 1.9 | 1981 | 1.9 | 1982 | 2.6 | 1983 | 2.6 | 1984 | 2.6 |
| 1974 | 2.2 | 1975 | 2.1 | 1976 | 2.1 | 1977 | 2.5 | 1978 | 2.1 | 1979 | 1.8 | 1980 | 1.8 | 1981 | 1.8 | 1982 | 2.5 | 1983 | 2.5 | 1984 | 2.5 | 1985 | 2.1 |
| 1975 | 2.1 | 1976 | 2.1 | 1977 | 2.5 | 1978 | 2.1 | 1979 | 1.7 | 1980 | 1.7 | 1981 | 1.7 | 1982 | 2.4 | 1983 | 2.4 | 1984 | 2.4 | 1985 | 2.0 | 1986 | 2.0 |
| 1976 | 2.0 | 1977 | 2.4 | 1978 | 2.0 | 1979 | 1.5 | 1980 | 1.5 | 1981 | 1.5 | 1982 | 2.3 | 1983 | 2.3 | 1984 | 2.3 | 1985 | 2.0 | 1986 | 2.0 | 1987 | 1.1 |
| 1977 | 2.4 | 1978 | 2.0 | 1979 | 1.4 | 1980 | 1.4 | 1981 | 1.4 | 1982 | 2.1 | 1983 | 2.1 | 1984 | 2.1 | 1985 | 1.9 | 1986 | 1.9 | 1987 | 1.0 | 1988 | 1.0 |
| 1978 | 2.0 | 1979 | 1.3 | 1980 | 1.3 | 1981 | 1.3 | 1982 | 2.0 | 1983 | 2.0 | 1984 | 2.0 | 1985 | 1.9 | 1986 | 1.9 | 1987 | 1.0 | 1988 | 1.0 | 1989 | 1.0 |
| 1979 | 1.1 | 1980 | 1.1 | 1981 | 1.1 | 1982 | 1.8 | 1983 | 1.8 | 1984 | 1.8 | 1985 | 1.8 | 1986 | 1.8 | 1987 | 0.9 | 1988 | 0.9 | 1989 | 0.9 | 1990 | 0.9 |
| 1980 | 1.0 | 1981 | 1.0 | 1982 | 1.8 | 1983 | 1.8 | 1984 | 1.8 | 1985 | 1.7 | 1986 | 1.7 | 1987 | 0.9 | 1988 | 0.9 | 1989 | 0.9 | 1990 | 0.9 | 1991 | 0.9 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 2.6 | 1974 | 2.6 | 1975 | 2.4 | 1976 | 2.4 | 1977 | 2.8 | 1978 | 2.4 | 1979 | 2.6 | 1980 | 2.6 | 1981 | 2.6 | 1982 | 3.4 | 1983 | 3.4 | 1984 | 3.4 |
| 1974 | 2.6 | 1975 | 2.4 | 1976 | 2.4 | 1977 | 2.8 | 1978 | 2.4 | 1979 | 2.6 | 1980 | 2.6 | 1981 | 2.6 | 1982 | 3.3 | 1983 | 3.3 | 1984 | 3.3 | 1985 | 2.4 |
| 1975 | 2.4 | 1976 | 2.4 | 1977 | 2.8 | 1978 | 2.4 | 1979 | 2.6 | 1980 | 2.6 | 1981 | 2.6 | 1982 | 3.3 | 1983 | 3.3 | 1984 | 3.3 | 1985 | 2.4 | 1986 | 2.4 |
| 1976 | 2.4 | 1977 | 2.7 | 1978 | 2.4 | 1979 | 2.5 | 1980 | 2.5 | 1981 | 2.5 | 1982 | 3.2 | 1983 | 3.2 | 1984 | 3.2 | 1985 | 2.4 | 1986 | 2.4 | 1987 | 1.5 |
| 1977 | 2.7 | 1978 | 2.4 | 1979 | 2.5 | 1980 | 2.5 | 1981 | 2.5 | 1982 | 3.2 | 1983 | 3.2 | 1984 | 3.2 | 1985 | 2.4 | 1986 | 2.4 | 1987 | 1.5 | 1988 | 1.5 |
| 1978 | 2.3 | 1979 | 2.4 | 1980 | 2.4 | 1981 | 2.4 | 1982 | 3.1 | 1983 | 3.1 | 1984 | 3.1 | 1985 | 2.3 | 1986 | 2.3 | 1987 | 1.5 | 1988 | 1.5 | 1989 | 1.5 |
| 1979 | 2.3 | 1980 | 2.3 | 1981 | 2.3 | 1982 | 3.1 | 1983 | 3.1 | 1984 | 3.1 | 1985 | 2.3 | 1986 | 2.3 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 |
| 1980 | 2.3 | 1981 | 2.3 | 1982 | 3.0 | 1983 | 3.0 | 1984 | 3.0 | 1985 | 2.3 | 1986 | 2.3 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 | 1991 | 1.4 |
| 1981 | 2.2 | 1982 | 2.9 | 1983 | 2.9 | 1984 | 2.9 | 1985 | 2.3 | 1986 | 2.3 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 | 1991 | 1.4 | 1992 | 1.4 |
| 1982 | 2.8 | 1983 | 2.8 | 1984 | 2.8 | 1985 | 2.2 | 1986 | 2.2 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 | 1991 | 1.4 | 1992 | 1.4 | 1993 | 1.4 |
| 1983 | 2.8 | 1984 | 2.8 | 1985 | 2.2 | 1986 | 2.2 | 1987 | 1.3 | 1988 | 1.3 | 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 | 1993 | 1.3 | 1994 | 1.3 |
| 1984 | 2.7 | 1985 | 2.2 | 1986 | 2.2 | 1987 | 1.3 | 1988 | 1.3 | 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 | 1993 | 1.3 | 1994 | 1.3 | 1995 | 1.3 |
| 1985 | 2.1 | 1986 | 2.1 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 | 1991 | 1.2 | 1992 | 1.2 | 1993 | 1.2 | 1994 | 1.2 | 1995 | 1.2 | 1996 | 1.2 |
| 1986 | 2.1 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 | 1991 | 1.2 | 1992 | 1.2 | 1993 | 1.2 | 1994 | 1.2 | 1995 | 1.2 | 1996 | 1.2 | 1997 | 1.2 |
| 1987 | 1.1 | 1988 | 1.1 | 1989 | 1.1 | 1990 | 1.1 | 1991 | 1.1 | 1992 | 1.1 | 1993 | 1.1 | 1994 | 1.1 | 1995 | 1.1 | 1996 | 1.1 | 1997 | 1.1 | 1998 | 1.1 |
| 1988 | 1.1 | 1989 | 1.1 | 1990 | 1.1 | 1991 | 1.1 | 1992 | 1.1 | 1993 | 1.1 | 1994 | 1.1 | 1995 | 1.1 | 1996 | 1.1 | 1997 | 1.1 | 1998 | 1.1 | 1999 | 1.1 |
| 1989 | 1.0 | 1990 | 1.0 | 1991 | 1.0 | 1992 | 1.0 | 1993 | 1.0 | 1994 | 1.0 | 1995 | 1.0 | 1996 | 1.0 | 1997 | 1.0 | 1998 | 1.0 | 1999 | 1.0 | 2000 | 1.0 |
| 1990 | 1.0 | 1991 | 1.0 | 1992 | 1.0 | 1993 | 1.0 | 1994 | 1.0 | 1995 | 1.0 | 1996 | 1.0 | 1997 | 1.0 | 1998 | 1.0 | 1999 | 1.0 | 2000 | 1.0 | 2001 | 1.0 |
| 1991 | 0.9 | 1992 | 0.9 | 1993 | 0.9 | 1994 | 0.9 | 1995 | 0.9 | 1996 | 0.9 | 1997 | 0.9 | 1998 | 0.9 | 1999 | 0.9 | 2000 | 0.9 | 2001 | 0.9 | 2002 | 0.9 |
| 1992 | 0.9 | 1993 | 0.9 | 1994 | 0.9 | 1995 | 0.9 | 1996 | 0.9 | 1997 | 0.9 | 1998 | 0.9 | 1999 | 0.9 | 2000 | 0.9 | 2001 | 0.9 | 2002 | 0.9 | 2003 | 0.9 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.2.4.

## TABLE 2.2.3

## IDLE EMISSION RATES FOR
## HIGH ALTITUDE
## LIGHT DUTY GASOLINE POWERED TRUCKS I

* IER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Min.) | Deterioration Rate (Gm/Min/10K Mi) |
|---|---|---|---|
| HC | Pre-1968 | 1.63 | 0.03 |
| | 1968-1969 | 0.76 | 0.06 |
| | 1970-1971 | 0.71 | 0.07 |
| | 1972-1974 | 0.74 | 0.04 |
| | 1975-1976 | 0.33 | 0.06 |
| | 1977 | 0.15 | 0.06 |
| | 1978 | 0.30 | 0.06 |
| | 1979-1980 | 0.06 | 0.02 |
| | 1981 | 0.10 | 0.02 |
| | 1982-1983 | 0.07 | 0.02 |
| | 1984 | 0.04 | 0.01 |
| | 1985-1986 | 0.04 | 0.01 |
| | 1987+ | 0.04 | 0.01 |
| CO | Pre-1968 | 15.98 | 0.40 |
| | 1968-1969 | 11.24 | 0.63 |
| | 1970-1971 | 12.93 | 0.88 |
| | 1972-1974 | 13.99 | 0.76 |
| | 1975-1976 | 7.76 | 0.72 |
| | 1977 | 3.00 | 0.72 |
| | 1978 | 6.05 | 0.72 |
| | 1979-1980 | 1.52 | 0.32 |
| | 1981 | 2.27 | 0.27 |
| | 1982-1983 | 1.72 | 0.24 |
| | 1984 | 0.69 | 0.14 |
| | 1985-1986 | 0.49 | 0.28 |
| | 1987+ | 0.49 | 0.28 |
| NOx | Pre-1968 | 0.11 | 0.0 |
| | 1968-1972 | 0.09 | 0.0 |
| | 1973-1974 | 0.07 | 0.0 |
| | 1975-1976 | 0.02 | 0.0 |
| | 1977 | 0.02 | 0.0 |
| | 1978 | 0.01 | 0.0 |
| | 1979-1980 | 0.01 | 0.0 |
| | 1981 | 0.06 | 0.0 |
| | 1982-1983 | 0.06 | 0.0 |
| | 1984 | 0.05 | 0.0 |
| | 1985-1986 | 0.02 | 0.0 |
| | 1987+ | 0.02 | 0.0 |

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

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## TABLE 2.2.4

## REGISTRATION MIX AND MILEAGE ACCUMULATION RATES FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS I

| Model Year Index** | July 1 Registration Mix* | Mileage Accumulation Rate per truck * | Jan 1 Registration Mix | Jan 1 Mileage Accumulation Rate (fleet) | Jan 1 Mileage Accumulation (fleet) |
|---|---|---|---|---|---|
| 1 | 0.067 | 17394. | 0.022 | 17394. | 2174. |
| 2 | 0.085 | 16132. | 0.085 | 17078. | 13006. |
| 3 | 0.081 | 14961. | 0.081 | 15839. | 29456. |
| 4 | 0.077 | 13876. | 0.077 | 14690. | 44713. |
| 5 | 0.073 | 12869. | 0.073 | 13624. | 58862. |
| 6 | 0.069 | 11935. | 0.069 | 12635. | 71986. |
| 7 | 0.065 | 11069. | 0.065 | 11718. | 84156. |
| 8 | 0.061 | 10266. | 0.061 | 10868. | 95444. |
| 9 | 0.057 | 9521. | 0.057 | 10080. | 105912. |
| 10 | 0.053 | 8830. | 0.053 | 9348. | 115621. |
| 11 | 0.048 | 8189. | 0.048 | 8670. | 124625. |
| 12 | 0.044 | 7595. | 0.044 | 8040. | 132976. |
| 13 | 0.040 | 7044. | 0.040 | 7457. | 140720. |
| 14 | 0.036 | 6533. | 0.036 | 6916. | 147903. |
| 15 | 0.032 | 6059. | 0.032 | 6414. | 154565. |
| 16 | 0.028 | 5619. | 0.028 | 5949. | 160744. |
| 17 | 0.024 | 5211. | 0.024 | 5517. | 166474. |
| 18 | 0.020 | 4833. | 0.020 | 5116. | 171787. |
| 19 | 0.016 | 4483. | 0.016 | 4745. | 176716. |
| 20+ | 0.024 | 4157. | 0.024 | 4401. | 181287. |

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

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## TABLE 2.2.5

### EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR
### HIGH ALTITUDE
### LIGHT DUTY GASOLINE POWERED TRUCKS I
### JANUARY 1, 1988

| Model Years | (A) LDTI Fleet Registration | (B) Sales Fraction | (A*B) | (C=A*B/DAF) LDGT1 Registration | (D) Annual Mileage Accrual Rate | (C*D) | (C*D/TFNORM) Travel Fractions |
|---|---|---|---|---|---|---|---|
| 1988 | 0.022 | 0.760 | 0.017 | 0.019 | 17394. | 337.1 | 0.031 |
| 1987 | 0.085 | 0.790 | 0.067 | 0.077 | 17078. | 1309.6 | 0.120 |
| 1986 | 0.081 | 0.820 | 0.066 | 0.076 | 15839. | 1201.4 | 0.110 |
| 1985 | 0.077 | 0.840 | 0.065 | 0.074 | 14690. | 1085.0 | 0.099 |
| 1984 | 0.073 | 0.870 | 0.064 | 0.073 | 13624. | 988.1 | 0.091 |
| 1983 | 0.069 | 0.900 | 0.062 | 0.071 | 12635. | 896.0 | 0.082 |
| 1982 | 0.065 | 0.920 | 0.060 | 0.068 | 11718. | 800.2 | 0.073 |
| 1981 | 0.061 | 0.940 | 0.057 | 0.065 | 10868. | 711.6 | 0.065 |
| 1980 | 0.057 | 0.966 | 0.055 | 0.063 | 10080. | 633.8 | 0.058 |
| 1979 | 0.053 | 0.972 | 0.052 | 0.059 | 9348. | 549.9 | 0.050 |
| 1978 | 0.048 | 0.991 | 0.048 | 0.054 | 8670. | 470.9 | 0.043 |
| 1977 | 0.044 | 0.995 | 0.044 | 0.050 | 8040. | 402.0 | 0.037 |
| 1976 | 0.040 | 0.997 | 0.040 | 0.046 | 7457. | 339.6 | 0.031 |
| 1975 | 0.036 | 0.998 | 0.036 | 0.041 | 6916. | 283.8 | 0.026 |
| 1974 | 0.032 | 1.000 | 0.032 | 0.037 | 6414. | 234.4 | 0.021 |
| 1973 | 0.028 | 1.000 | 0.028 | 0.032 | 5949. | 190.2 | 0.017 |
| 1972 | 0.024 | 1.000 | 0.024 | 0.027 | 5517. | 151.2 | 0.014 |
| 1971 | 0.020 | 1.000 | 0.020 | 0.023 | 5116. | 116.9 | 0.011 |
| 1970 | 0.016 | 1.000 | 0.016 | 0.018 | 4745. | 86.7 | 0.008 |
| 1969- | 0.024 | 1.000 | 0.024 | 0.027 | 4401. | 120.6 | 0.011 |
|  |  | DAF: | 0.876 |  | TFNORM: | 10909.0 |  |

WHERE :

A = January 1 registration mix from Table 2.2.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 2.2.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI) = .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

NOTE : In general, the travel weighting fractions will change for every calendar year since the sales fraction (column B) changes for almost every model year.

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## TABLE 2.2.6

## SPEED CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS I

$* \ SCF(s,sadj) = SF(s)/SF(sadj)$

$SF(s) = EXP(A + B*s + C*s^2 + D*S^3 + E*s^4 + F*s^5)$, HC & CO
$= A + B*s + C*s^2 + D*s^3 + E*s^4 + F*s^5$ , NOx

| Pollutant and Model Years | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| HC | | | | | | |
| Pre-1968 | 0.224612E+01 | -0.290973E+00 | 0.158890E-01 | -0.472494E-03 | 0.694077E-05 | -0.392798E-07 |
| 1968 | 0.202779E+01 | -0.273049E+00 | 0.153577E-01 | -0.460304E-03 | 0.678527E-05 | -0.384880E-07 |
| 1969 | 0.215056E+01 | -0.283620E+00 | 0.153836E-01 | -0.442136E-03 | 0.628732E-05 | -0.346311E-07 |
| 1970 | 0.223021E+01 | -0.293648E+00 | 0.162356E-01 | -0.484148E-03 | 0.711591E-05 | -0.402861E-07 |
| 1971 | 0.212230E+01 | -0.291072E+00 | 0.169089E-01 | -0.526148E-03 | 0.802705E-05 | -0.470117E-07 |
| 1972 | 0.215361E+01 | -0.283451E+00 | 0.156948E-01 | -0.469759E-03 | 0.693832E-05 | -0.394707E-07 |
| 1973-1974 | 0.211340E+01 | -0.285676E+00 | 0.163180E-01 | -0.500793E-03 | 0.755067E-05 | -0.437187E-07 |
| 1975+ | 0.239540E+01 | -0.335781E+00 | 0.211609E-01 | -0.731550E-03 | 0.120715E-04 | -0.748566E-07 |
| CO | | | | | | |
| Pre-1968 | 0.181978E+01 | -0.254663E+00 | 0.152347E-01 | -0.487397E-03 | 0.758207E-05 | -0.449514E-07 |
| 1968 | 0.186919E+01 | -0.276679E+00 | 0.172335E-01 | -0.558279E-03 | 0.871678E-05 | -0.516980E-07 |
| 1969 | 0.182133E+01 | -0.272054E+00 | 0.170304E-01 | -0.552021E-03 | 0.862543E-05 | -0.511440E-07 |
| 1970 | 0.201421E+01 | -0.295188E+00 | 0.186353E-01 | -0.621606E-03 | 0.993657E-05 | -0.599779E-07 |
| 1971 | 0.204533E+01 | -0.310618E+00 | 0.204852E-01 | -0.708527E-03 | 0.116215E-04 | -0.715690E-07 |
| 1972 | 0.231868E+01 | -0.341147E+00 | 0.209446E-01 | -0.665891E-03 | 0.102225E-04 | -0.598264E-07 |
| 1973-1974 | 0.215487E+01 | -0.329116E+00 | 0.210112E-01 | -0.689057E-03 | 0.108390E-04 | -0.647125E-07 |
| 1975+ | 0.248747E+01 | -0.391562E+00 | 0.270721E-01 | -0.976178E-03 | 0.165270E-04 | -0.104317E-06 |
| NOx | | | | | | |
| Pre-1968 | 0.244424E+01 | -0.250107E+00 | 0.138293E-01 | -0.287025E-03 | 0.207585E-05 | 0.0 |
| 1968 | 0.188656E+01 | -0.161289E+00 | 0.904995E-02 | -0.185609E-03 | 0.132555E-05 | 0.0 |
| 1969 | 0.155777E+01 | -0.113032E+00 | 0.671832E-02 | -0.143409E-03 | 0.106079E-05 | 0.0 |
| 1970 | 0.204516E+01 | -0.194014E+00 | 0.110736E-01 | -0.231754E-03 | 0.168372E-05 | 0.0 |
| 1971 | 0.163262E+01 | -0.121861E+00 | 0.703020E-02 | -0.146293E-03 | 0.106141E-05 | 0.0 |
| 1972 | 0.144825E+01 | -0.122444E+00 | 0.795024E-02 | -0.171078E-03 | 0.125777E-05 | 0.0 |
| 1973-1974 | 0.153447E+01 | -0.125671E+00 | 0.785919E-02 | -0.169428E-03 | 0.125494E-05 | 0.0 |
| 1975+ | 0.942131E+00 | -0.423240E-01 | 0.386253E-02 | -0.939853E-04 | 0.753883E-06 | 0.0 |

* WHERE : s = average speed (mph)
sadj = basic test procedure speed; adjusted for fraction of cold start operation x and fraction of hot start operation w, [ 1/sadj = (w+x)/26 + (1-w-x)/16 ]

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TABLE 2.2.7A

# TEMPERATURE CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS I

* TCF(b) = EXP( TC(b) * (T - 75.0))

| Pol | Model Years | Test segment 1 |  | Test segment 2 |  | Test segment 3 |  |
|---|---|---|---|---|---|---|---|
|  |  | TC Low | TC High | TC Low | TC High | TC Low | TC High |
| HC | Pre-1968 | -0.20623E-01 | -0.14381E-01 | -0.24032E-02 | 0.13219E-02 | -0.10081E-02 | 0.34799E-02 |
|  | 1968-1969 | -0.24462E-01 | -0.12552E-01 | -0.32017E-02 | 0.42667E-02 | -0.86884E-03 | 0.75843E-02 |
|  | 1970-1971 | -0.21255E-01 | -0.10888E-01 | -0.52755E-03 | -0.47925E-03 | 0.93659E-03 | 0.76666E-02 |
|  | 1972-1974 | -0.21427E-01 | -0.66107E-02 | -0.39442E-03 | 0.26288E-02 | 0.49731E-02 | 0.12320E-01 |
|  | 1975-1983 | -0.23517E-01 | -0.14095E-01 | -0.88057E-02 | 0.26179E-01 | -0.16222E-02 | 0.24297E-01 |
|  | 1984+ | -0.33883E-01 | 0.11959E-01 | -0.10113E-01 | -0.12627E-04 | -0.80650E-02 | 0.78765E-02 |
| CO | Pre-1968 | -0.13487E-01 | -0.14691E-01 | 0.15784E-02 | 0.37462E-02 | 0.11097E-02 | 0.11014E-01 |
|  | 1968-1969 | -0.21126E-01 | -0.38767E-01 | -0.15289E-02 | 0.84685E-02 | 0.15749E-02 | 0.25179E-01 |
|  | 1970-1971 | -0.20843E-01 | -0.21165E-01 | -0.59951E-02 | 0.23603E-01 | 0.18253E-02 | 0.28483E-01 |
|  | 1972-1974 | -0.19091E-01 | -0.13146E-01 | -0.42373E-03 | 0.24717E-01 | 0.57982E-02 | 0.25848E-01 |
|  | 1975-1983 | -0.24835E-01 | -0.19612E-01 | -0.88336E-02 | 0.48537E-01 | -0.11553E-02 | 0.31439E-01 |
|  | 1984+ | see NOTE 2 | -0.12596E-01 | -0.18813E-01 | 0.13861E-01 | -0.11951E-01 | 0.96939E-02 |
| NOx | Pre-1968 | -0.16897E-03 | 0.38841E-02 | -0.89245E-02 | -0.87325E-02 | -0.72580E-02 | -0.10839E-01 |
|  | 1968-1972 | -0.25074E-03 | -0.10389E-02 | -0.59791E-02 | -0.92466E-02 | -0.62690E-02 | -0.10108E-01 |
|  | 1973-1974 | 0.38855E-02 | -0.18301E-01 | -0.24156E-02 | -0.10925E-01 | -0.21188E-02 | -0.18042E-01 |
|  | 1975-1978 | -0.45504E-04 | -0.71420E-02 | -0.12575E-02 | -0.87910E-02 | -0.53153E-03 | -0.75470E-02 |
|  | 1979-1986 | -0.76044E-02 | -0.26153E-01 | -0.68045E-02 | -0.18603E-01 | -0.54198E-02 | -0.20878E-01 |
|  | 1987+ | -0.53710E-02 | -0.34416E-01 | -0.65050E-02 | -0.35871E-01 | -0.85650E-02 | -0.28830E-01 |

* WHERE :

TCF(b) = Temperature correction factor for appropriate pollutant, ambient temperature, and model year; for test segment b
T = Ambient temperature (Fahrenheit)
TC(b) = Temperature correction factor coefficient for appropriate pollutant, reference temperature and model year; for test segment b
75.0 = Reference temperature

NOTE 1 : The temperature correction factor is used in conjunction with the Ripstwxn correction factor given in Table 2.2.7B.

NOTE 2 : Offset model used for Bag 1 CO. Offset = -1.3812*(T - 75.0).

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## TABLE 2.2.7B

### NORMALIZED BAG FRACTIONS FOR
### HIGH ALTITUDE
### LIGHT DUTY GASOLINE POWERED TRUCKS I

| | | Normalized Fractions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Model | Test Seg.#1 | | Test Seg.#2 | | Test Seg.#3 | | Total Test | |
| Pol | Years | B1 | D1 | B2 | D2 | B3 | D3 | B0 | D0 |
| HC | Pre-1968 | 1.282 | 0.025 | 0.973 | 0.028 | 0.839 | 0.019 | 1.000 | 0.025 |
| | 1968-1969 | 1.345 | 0.074 | 0.946 | 0.054 | 0.842 | 0.048 | 1.000 | 0.056 |
| | 1970-1971 | 1.345 | 0.178 | 0.919 | 0.118 | 0.894 | 0.093 | 1.000 | 0.124 |
| | 1972-1974 | 1.398 | 0.060 | 0.885 | 0.055 | 0.919 | 0.036 | 1.000 | 0.051 |
| | 1975-1983 | 1.860 | 0.345 | 0.766 | 0.234 | 0.804 | 0.196 | 1.000 | 0.243 |
| | 1984-1986 | 2.200 | 0.714 | 0.571 | 0.171 | 0.914 | 0.143 | 1.000 | 0.286 |
| | 1987+ | 2.634 | 1.104 | 0.368 | 0.499 | 0.973 | 0.391 | 1.000 | 0.594 |
| CO | Pre-1968 | 1.277 | 0.033 | 1.017 | 0.029 | 0.758 | 0.025 | 1.000 | 0.029 |
| | 1968-1969 | 1.442 | 0.071 | 0.996 | 0.042 | 0.674 | 0.033 | 1.000 | 0.046 |
| | 1970-1971 | 1.553 | 0.109 | 0.933 | 0.079 | 0.711 | 0.038 | 1.000 | 0.074 |
| | 1972-1974 | 1.573 | 0.054 | 0.902 | 0.079 | 0.755 | 0.029 | 1.000 | 0.060 |
| | 1975-1983 | 1.972 | 0.176 | 0.881 | 0.157 | 0.628 | 0.109 | 1.000 | 0.139 |
| | 1984-1986 | 2.438 | 0.282 | 0.658 | 0.062 | 0.621 | 0.077 | 1.000 | 0.111 |
| | 1987+ | 3.941 | 2.009 | 0.0 | 1.186 | 0.689 | 1.014 | 1.000 | 1.308 |
| NOx | Pre-1968 | 1.121 | 0.009 | 0.785 | 0.001 | 1.319 | -0.009 | 1.000 | 0.0 |
| | 1968-1972 | 1.199 | -0.004 | 0.793 | -0.002 | 1.245 | 0.006 | 1.000 | 0.0 |
| | 1973-1974 | 1.262 | 0.022 | 0.770 | 0.004 | 1.242 | 0.027 | 1.000 | 0.014 |
| | 1975-1978 | 1.299 | 0.012 | 0.783 | 0.004 | 1.197 | 0.016 | 1.000 | 0.012 |
| | 1979-1986 | 1.372 | 0.040 | 0.766 | 0.046 | 1.167 | 0.063 | 1.000 | 0.051 |
| | 1987+ | 1.830 | 0.169 | 0.703 | 0.149 | 0.939 | 0.222 | 1.000 | 0.173 |

NOTE : The fractions given in this table are used in the calculation of the operating-mode/ temperature correction factor (OMTCF).

WHERE : OMTCF = ((TERM1 + TERM2 + TERM3)/DENOM)
TERM1 = W *TCF(1)*(B1+D1*M)
TERM2 = (1-W-X)*TCF(2)*(B2+D2*M)
TERM3 = X *TCF(3)*(B3+D3*M)
DENOM = B0 + D0*M
W = Fraction of VMT in the cold start mode
X = Fraction of VMT in the hot start mode
TCF(b) = Temperature correction factor for pollutant, model year; for test segment b
M = Cumulative mileage / 10,000

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## TABLE 2.2.8A

## AIR CONDITIONING CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS I

* $ACCF = U*V*(A + B*(T-75) - 1) + 1$

| Model Years | HC | | CO | | NOx | |
|---|---|---|---|---|---|---|
| | A | B | A | B | A | B |
| Pre-1975 | 0.1023E+01 | 0.3344E-02 | 0.1202E+01 | 0.1808E-02 | 0.1299E+01 | 0.5643E-04 |
| 1975+ | 0.1000E+01 | 0.3512E-02 | 0.1130E+01 | 0.1528E-02 | 0.1221E+01 | 0.4262E-03 |

* WHERE :

ACCF = Air Conditioning Correction Factor
V = Fraction of vehicles which are equipped with AC given in Table 2.2.8B
U = Fraction of vehicles with AC that are using it = (DI-DILO)/(DIHI-DI), 0<=U<=1
DI = Discomfort index = (DB+WB)*.4+15
DILO = The highest discomfort index where no AC is used
DIHI = The lowest discomfort index where all vehicles with AC use it
DB = Dry bulb temperature (Fahrenheit)
WB = Wet bulb temperature (Fahrenheit)
T = Ambient temperature (Fahrenheit)

## TABLE 2.2.8B

## ESTIMATED FRACTION OF HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS I EQUIPPED WITH AIR CONDITIONING

| Model Years | Fraction Equipped With Air Conditioning |
|---|---|
| Pre-1977 | 0.32 |
| 1977 | 0.52 |
| 1978+ | 0.39 |

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## TABLE 2.2.9

## EXTRA LOAD CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS I

* XLCF = (XLC-1)*U + 1

| Model Years | Coefficients (XLC) HC | CO | NOx |
|---|---|---|---|
| Pre-1968 | 1.0786 | 1.2765 | 0.9535 |
| 1968-1969 | 1.0495 | 1.1384 | 1.0313 |
| 1970-1971 | 1.0852 | 1.2478 | 1.0313 |
| 1972 | 1.0556 | 1.1347 | 1.0313 |
| 1973-1974 | 1.0556 | 1.1347 | 1.0753 |
| 1975+ | 1.0455 | 1.3058 | 1.0719 |

* WHERE :

XLCF = Extra load correction factor
U = Fraction of VMT with an extra load
XLC = Correction factor coefficient

## TABLE 2.2.10

## TRAILER TOWING CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS I

* TTCF = (TTC-1)*U + 1

| Model Years | Coefficients (TTC) HC | CO | NOx |
|---|---|---|---|
| Pre-1968 | 1.2614 | 1.9327 | 1.1184 |
| 1968-1969 | 1.2762 | 1.8940 | 1.1384 |
| 1970-1971 | 1.4598 | 2.4753 | 1.1384 |
| 1972 | 1.7288 | 2.1414 | 1.1384 |
| 1973-1974 | 1.7288 | 2.1414 | 1.2170 |
| 1975+ | 1.5909 | 3.9722 | 1.3875 |

* WHERE :

TTCF = Trailer towing correction factor
U = Fraction of VMT towing a trailer
TTC = Correction factor coefficient

DATE : MAY 25, 1985

## TABLE 2.3.1A

## EXHAUST EMISSION RATES FOR
## HIGH ALTITUDE
## LIGHT DUTY GASOLINE POWERED TRUCKS II
## (RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Mile) | Deterioration Rate (Gm/Mi/10K Mi) | 50,000 Mile Emission Level (Grams/Mile) |
|---|---|---|---|---|
| HC | Pre-1970 | 12.35 | 0.18 | 13.25 |
| | 1970-1973 | 8.56 | 0.25 | 9.81 |
| | 1974-1978 | 8.56 | 0.17 | 9.41 |
| | 1979-1980 | 1.81 | 0.27 | 3.16 |
| | 1981 | 1.81 | 0.19 | 2.76 |
| | 1982-1983 | 1.08 | 0.19 | 2.03 |
| | 1984 | 0.72 | 0.13 | 1.37 |
| | 1985-1986 | 0.55 | 0.07 | 0.90 |
| | 1987+ | 0.62 | 0.06 | 0.92 |
| CO | Pre-1970 | 141.35 | 2.25 | 152.60 |
| | 1970-1973 | 107.72 | 2.55 | 120.47 |
| | 1974-1978 | 107.72 | 2.44 | 119.92 |
| | 1979-1980 | 29.83 | 2.59 | 42.78 |
| | 1981 | 29.83 | 1.13 | 35.48 |
| | 1982-1983 | 19.75 | 1.13 | 25.40 |
| | 1984 | 12.95 | 0.98 | 17.85 |
| | 1985-1986 | 8.88 | 0.49 | 11.33 |
| | 1987+ | 7.74 | 0.91 | 12.29 |
| NOx | Pre-1970 | 3.10 | 0.0 | 3.10 |
| | 1970-1973 | 4.32 | 0.0 | 4.32 |
| | 1974-1978 | 3.07 | 0.04 | 3.27 |
| | 1979-1980 | 1.02 | 0.09 | 1.47 |
| | 1981 | 1.02 | 0.09 | 1.47 |
| | 1982-1983 | 1.74 | 0.09 | 2.19 |
| | 1984 | 1.74 | 0.09 | 2.19 |
| | 1985-1986 | 1.74 | 0.04 | 1.94 |
| | 1987+ | 0.86 | 0.04 | 1.06 |

* WHERE : BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

DATE : MAY 25, 1985

## TABLE 2.3.1B

## EXHAUST EMISSION RATES FOR
## HIGH ALTITUDE
## LIGHT DUTY GASOLINE POWERED TRUCKS II
## AT VARIOUS MILEAGE INTERVALS
## (RATES INCLUDE TAMPERING)

| Pol | Model Years | Emission Rate (Grams/Mile)<br>0K | 20K | 40K | 60K | 80K | 100K | 120K | 140K |
|---|---|---|---|---|---|---|---|---|---|
| HC | Pre-1970 | 12.35 | 12.71 | 13.07 | 13.43 | 13.78 | 14.14 | 14.50 | 14.86 |
| | 1970-1973 | 8.56 | 9.07 | 9.57 | 10.08 | 10.59 | 11.09 | 11.60 | 12.10 |
| | 1974-1978 | 8.56 | 8.90 | 9.23 | 9.57 | 9.91 | 10.25 | 10.59 | 10.93 |
| | 1979-1980 | 2.42 | 3.15 | 3.89 | 4.62 | 5.35 | 6.09 | 6.82 | 7.55 |
| | 1981 | 2.42 | 2.99 | 3.56 | 4.13 | 4.71 | 5.28 | 5.85 | 6.42 |
| | 1982 | 1.68 | 2.26 | 2.83 | 3.40 | 3.97 | 4.54 | 5.11 | 5.68 |
| | 1983 | 1.66 | 2.22 | 2.79 | 3.35 | 3.91 | 4.47 | 5.04 | 5.60 |
| | 1984 | 1.22 | 1.62 | 2.02 | 2.42 | 2.83 | 3.23 | 3.63 | 4.03 |
| | 1985-1986 | 1.05 | 1.33 | 1.62 | 1.91 | 2.19 | 2.48 | 2.77 | 3.05 |
| | 1987+ | 1.01 | 1.24 | 1.48 | 1.72 | 1.95 | 2.19 | 2.43 | 2.66 |
| CO | Pre-1970 | 141.33 | 145.76 | 150.19 | 154.62 | 159.05 | 163.49 | 167.93 | 172.37 |
| | 1970-1973 | 107.72 | 112.72 | 117.72 | 122.74 | 127.76 | 132.78 | 137.80 | 142.83 |
| | 1974-1978 | 107.73 | 112.65 | 117.56 | 122.48 | 127.39 | 132.29 | 137.20 | 142.10 |
| | 1979-1980 | 36.32 | 43.79 | 51.26 | 58.72 | 66.17 | 73.62 | 81.06 | 88.50 |
| | 1981 | 36.32 | 40.75 | 45.15 | 49.53 | 53.90 | 58.25 | 62.60 | 66.95 |
| | 1982 | 25.87 | 30.24 | 34.61 | 38.96 | 43.31 | 47.65 | 51.98 | 56.32 |
| | 1983 | 25.66 | 29.95 | 34.24 | 38.51 | 42.78 | 47.04 | 51.29 | 55.55 |
| | 1984 | 17.69 | 21.23 | 24.79 | 28.35 | 31.92 | 35.48 | 39.05 | 42.61 |
| | 1985-1986 | 13.56 | 16.12 | 18.69 | 21.27 | 23.85 | 26.43 | 29.01 | 31.59 |
| | 1987+ | 11.33 | 14.38 | 17.44 | 20.50 | 23.56 | 26.62 | 29.68 | 32.74 |
| NOx | Pre-1970 | 3.10 | 3.10 | 3.10 | 3.10 | 3.10 | 3.10 | 3.10 | 3.10 |
| | 1970-1972 | 4.32 | 4.32 | 4.32 | 4.31 | 4.31 | 4.31 | 4.31 | 4.31 |
| | 1973 | 4.34 | 4.35 | 4.37 | 4.38 | 4.39 | 4.41 | 4.42 | 4.44 |
| | 1974-1978 | 3.09 | 3.18 | 3.28 | 3.38 | 3.47 | 3.57 | 3.66 | 3.76 |
| | 1979-1981 | 1.19 | 1.52 | 1.85 | 2.18 | 2.51 | 2.84 | 3.17 | 3.50 |
| | 1982 | 1.92 | 2.24 | 2.57 | 2.90 | 3.23 | 3.55 | 3.88 | 4.21 |
| | 1983 | 1.92 | 2.24 | 2.57 | 2.90 | 3.23 | 3.55 | 3.88 | 4.21 |
| | 1984 | 1.95 | 2.28 | 2.62 | 2.95 | 3.29 | 3.62 | 3.95 | 4.29 |
| | 1985-1986 | 1.95 | 2.18 | 2.42 | 2.65 | 2.89 | 3.12 | 3.36 | 3.60 |
| | 1987+ | 1.19 | 1.39 | 1.59 | 1.80 | 2.00 | 2.20 | 2.41 | 2.61 |

DATE : MAY 25, 1985

## TABLE 2.3.1C

## CRANKCASE AND EVAPORATIVE HYDROCARBON EMISSIONS
## FOR HIGH ALTITUDE
## LIGHT DUTY GASOLINE POWERED TRUCKS II
## (RATES REFLECT ZERO TAMPERING)

** CCEV = (HSK * TPD + DNL)/MPD + CC

| Model Years | SHED Hot Soak Emissions (Gm/Trip) | Trips* Per Day | SHED Diurnal Emissions (Gm/Day) | Miles* Per Day | Crankcase Emissions (Gm/Mile) | Total Crankcase and Evap. Emissions (Gm/Mile) |
|---|---|---|---|---|---|---|
| Pre-1968 | 35.96 | 3.05 | 101.26 | 33.70 | 7.35 | 13.61 |
| 1968-1978 | 35.96 | 3.05 | 101.26 | 33.70 | 0.0 | 6.26 |
| 1979-1981 | 10.31 | 3.05 | 24.11 | 33.70 | 0.0 | 1.65 |
| 1982-1983 | 10.31 | 3.05 | 12.10 | 33.70 | 0.0 | 1.29 |
| 1984 | 4.67 | 3.05 | 12.10 | 33.70 | 0.0 | 0.78 |
| 1985 | 4.16 | 3.05 | 12.10 | 33.70 | 0.0 | 0.74 |
| 1986 | 3.65 | 3.05 | 12.10 | 33.70 | 0.0 | 0.69 |
| 1987 | 3.21 | 3.05 | 12.10 | 33.70 | 0.0 | 0.65 |
| 1988-1989 | 2.67 | 3.05 | 12.10 | 33.70 | 0.0 | 0.60 |
| 1990+ | 2.37 | 3.05 | 12.10 | 33.70 | 0.0 | 0.57 |

* Default information that may be altered by the MOBILE3 user with information about the local area.

** WHERE :

CCEV = Total untampered crankcase & evaporative HC emissions (Gm/Mile)
HSK = Hot soak emissions (Gm/Trip)
TPD = Trips per day
DNL = Diurnal emissions (Gm/Day)
MPD = Miles per day
CC = Crankcase emissions (Gm/Mile)

DATE : MAY 25, 1985

## TABLE 2.3.1D

## TOTAL CRANKCASE AND EVAPORATIVE HC EMISSIONS
## FOR HIGH ALTITUDE
## LIGHT DUTY GASOLINE POWERED TRUCKS II
## AT VARIOUS MILEAGE INTERVALS
## (RATES INCLUDE TAMPERING)

| Model | Emission Rate (Grams/Mile) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Years | 0K | 20K | 40K | 60K | 80K | 100K | 120K | 140K |
| Pre-1968 | 13.61 | 13.61 | 13.61 | 13.61 | 13.61 | 13.61 | 13.61 | 13.61 |
| 1968-1970 | 6.42 | 6.45 | 6.47 | 6.50 | 6.52 | 6.55 | 6.57 | 6.60 |
| 1971-1974 | 6.41 | 6.43 | 6.46 | 6.48 | 6.51 | 6.53 | 6.55 | 6.58 |
| 1975-1977 | 6.41 | 6.43 | 6.45 | 6.48 | 6.50 | 6.53 | 6.55 | 6.57 |
| 1978 | 6.40 | 6.42 | 6.45 | 6.47 | 6.49 | 6.51 | 6.54 | 6.56 |
| 1979 | 1.84 | 1.88 | 1.91 | 1.94 | 1.97 | 2.01 | 2.04 | 2.07 |
| 1980 | 1.82 | 1.85 | 1.88 | 1.91 | 1.94 | 1.97 | 2.00 | 2.03 |
| 1981 | 1.82 | 1.85 | 1.88 | 1.91 | 1.94 | 1.96 | 1.99 | 2.02 |
| 1982 | 1.46 | 1.49 | 1.52 | 1.55 | 1.58 | 1.61 | 1.64 | 1.67 |
| 1983 | 1.46 | 1.48 | 1.51 | 1.54 | 1.57 | 1.59 | 1.62 | 1.65 |
| 1984 | 0.94 | 0.96 | 0.99 | 1.02 | 1.04 | 1.07 | 1.09 | 1.12 |
| 1985 | 0.88 | 0.91 | 0.93 | 0.96 | 0.98 | 1.01 | 1.03 | 1.06 |
| 1986 | 0.83 | 0.86 | 0.88 | 0.90 | 0.93 | 0.95 | 0.97 | 1.00 |
| 1987 | 0.79 | 0.81 | 0.83 | 0.85 | 0.87 | 0.90 | 0.92 | 0.94 |
| 1988-1989 | 0.73 | 0.75 | 0.77 | 0.79 | 0.81 | 0.83 | 0.85 | 0.88 |
| 1990+ | 0.70 | 0.72 | 0.74 | 0.76 | 0.78 | 0.80 | 0.82 | 0.84 |

DATE : MAY 25, 1985

TABLE 2.3.2A

DATE : MAY 25, 1985

## EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
## LIGHT DUTY GASOLINE POWERED TRUCKS II
## TOTAL HC (INCLUDES EVAP & CRANKCASE)

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 29.3 | 1962 | 29.3 | 1963 | 29.3 | 1964 | 29.3 | 1965 | 29.3 | 1966 | 29.3 | 1967 | 29.3 | 1968 | 21.9 | 1969 | 21.9 | 1970 | 19.8 | 1971 | 19.8 | 1972 | 19.8 |
| 1962 | 29.2 | 1963 | 29.2 | 1964 | 29.2 | 1965 | 29.2 | 1966 | 29.2 | 1967 | 29.2 | 1968 | 21.9 | 1969 | 21.9 | 1970 | 19.7 | 1971 | 19.7 | 1972 | 19.7 | 1973 | 19.7 |
| 1963 | 29.1 | 1964 | 29.1 | 1965 | 29.1 | 1966 | 29.1 | 1967 | 29.1 | 1968 | 21.8 | 1969 | 21.8 | 1970 | 19.6 | 1971 | 19.6 | 1972 | 19.6 | 1973 | 19.6 | 1974 | 18.2 |
| 1964 | 29.0 | 1965 | 29.0 | 1966 | 29.0 | 1967 | 29.0 | 1968 | 21.7 | 1969 | 21.7 | 1970 | 19.5 | 1971 | 19.5 | 1972 | 19.5 | 1973 | 19.5 | 1974 | 18.1 | 1975 | 18.1 |
| 1965 | 28.9 | 1966 | 28.9 | 1967 | 28.9 | 1968 | 21.6 | 1969 | 21.6 | 1970 | 19.3 | 1971 | 19.3 | 1972 | 19.3 | 1973 | 19.3 | 1974 | 18.0 | 1975 | 18.0 | 1976 | 18.0 |
| 1966 | 28.8 | 1967 | 28.8 | 1968 | 21.5 | 1969 | 21.5 | 1970 | 19.2 | 1971 | 19.2 | 1972 | 19.2 | 1973 | 19.2 | 1974 | 17.9 | 1975 | 17.9 | 1976 | 17.9 | 1977 | 17.9 |
| 1967 | 28.7 | 1968 | 21.3 | 1969 | 21.3 | 1970 | 19.0 | 1971 | 19.0 | 1972 | 19.0 | 1973 | 19.0 | 1974 | 17.8 | 1975 | 17.8 | 1976 | 17.8 | 1977 | 17.8 | 1978 | 17.8 |
| 1968 | 21.2 | 1969 | 21.2 | 1970 | 18.8 | 1971 | 18.8 | 1972 | 18.8 | 1973 | 18.8 | 1974 | 17.6 | 1975 | 17.6 | 1976 | 17.6 | 1977 | 17.6 | 1978 | 17.6 | 1979 | 7.7 |
| 1969 | 21.1 | 1970 | 18.6 | 1971 | 18.6 | 1972 | 18.6 | 1973 | 18.6 | 1974 | 17.5 | 1975 | 17.5 | 1976 | 17.5 | 1977 | 17.5 | 1978 | 17.5 | 1979 | 7.5 | 1980 | 7.5 |
| 1970 | 18.4 | 1971 | 18.4 | 1972 | 18.4 | 1973 | 18.4 | 1974 | 17.4 | 1975 | 17.4 | 1976 | 17.4 | 1977 | 17.4 | 1978 | 17.4 | 1979 | 7.3 | 1980 | 7.3 | 1981 | 6.3 |
| 1971 | 18.2 | 1972 | 18.2 | 1973 | 18.2 | 1974 | 17.2 | 1975 | 17.2 | 1976 | 17.2 | 1977 | 17.2 | 1978 | 17.2 | 1979 | 7.1 | 1980 | 7.1 | 1981 | 6.1 | 1982 | 5.0 |
| 1972 | 18.0 | 1973 | 18.0 | 1974 | 17.0 | 1975 | 17.0 | 1976 | 17.0 | 1977 | 17.0 | 1978 | 17.0 | 1979 | 6.8 | 1980 | 6.8 | 1981 | 5.9 | 1982 | 4.8 | 1983 | 4.8 |
| 1973 | 17.7 | 1974 | 16.9 | 1975 | 16.9 | 1976 | 16.9 | 1977 | 16.9 | 1978 | 16.9 | 1979 | 6.5 | 1980 | 6.5 | 1981 | 5.7 | 1982 | 4.6 | 1983 | 4.6 | 1984 | 3.1 |
| 1974 | 16.7 | 1975 | 16.7 | 1976 | 16.7 | 1977 | 16.7 | 1978 | 16.7 | 1979 | 6.2 | 1980 | 6.2 | 1981 | 5.5 | 1982 | 4.4 | 1983 | 4.4 | 1984 | 3.0 | 1985 | 2.2 |
| 1975 | 16.5 | 1976 | 16.5 | 1977 | 16.5 | 1978 | 16.5 | 1979 | 5.8 | 1980 | 5.8 | 1981 | 5.2 | 1982 | 4.1 | 1983 | 4.1 | 1984 | 2.8 | 1985 | 2.1 | 1986 | 2.1 |
| 1976 | 16.2 | 1977 | 16.2 | 1978 | 16.2 | 1979 | 5.5 | 1980 | 5.5 | 1981 | 5.0 | 1982 | 3.9 | 1983 | 3.9 | 1984 | 2.6 | 1985 | 2.0 | 1986 | 2.0 | 1987 | 1.9 |
| 1977 | 16.0 | 1978 | 16.0 | 1979 | 5.1 | 1980 | 5.1 | 1981 | 4.7 | 1982 | 3.6 | 1983 | 3.6 | 1984 | 2.4 | 1985 | 1.9 | 1986 | 1.9 | 1987 | 1.9 | 1988 | 1.8 |
| 1978 | 15.7 | 1979 | 4.7 | 1980 | 4.7 | 1981 | 4.4 | 1982 | 3.3 | 1983 | 3.3 | 1984 | 2.2 | 1985 | 1.8 | 1986 | 1.8 | 1987 | 1.8 | 1988 | 1.7 | 1989 | 1.7 |
| 1979 | 4.2 | 1980 | 4.2 | 1981 | 4.1 | 1982 | 3.0 | 1983 | 3.0 | 1984 | 2.0 | 1985 | 1.7 | 1986 | 1.7 | 1987 | 1.7 | 1988 | 1.6 | 1989 | 1.6 | 1990 | 1.6 |
| 1980 | 3.9 | 1981 | 3.9 | 1982 | 2.8 | 1983 | 2.8 | 1984 | 1.9 | 1985 | 1.6 | 1986 | 1.6 | 1987 | 1.6 | 1988 | 1.5 | 1989 | 1.5 | 1990 | 1.5 | 1991 | 1.5 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 19.8 | 1974 | 18.3 | 1975 | 18.3 | 1976 | 18.3 | 1977 | 18.3 | 1978 | 18.3 | 1979 | 8.8 | 1980 | 8.8 | 1981 | 7.3 | 1982 | 6.2 | 1983 | 6.2 | 1984 | 4.2 |
| 1974 | 18.3 | 1975 | 18.3 | 1976 | 18.3 | 1977 | 18.3 | 1978 | 18.3 | 1979 | 8.7 | 1980 | 8.7 | 1981 | 7.2 | 1982 | 6.2 | 1983 | 6.2 | 1984 | 4.2 | 1985 | 2.9 |
| 1975 | 18.2 | 1976 | 18.2 | 1977 | 18.2 | 1978 | 18.2 | 1979 | 8.6 | 1980 | 8.6 | 1981 | 7.2 | 1982 | 6.1 | 1983 | 6.1 | 1984 | 4.1 | 1985 | 2.8 | 1986 | 2.8 |
| 1976 | 18.1 | 1977 | 18.1 | 1978 | 18.1 | 1979 | 8.4 | 1980 | 8.4 | 1981 | 7.1 | 1982 | 6.0 | 1983 | 6.0 | 1984 | 4.1 | 1985 | 2.8 | 1986 | 2.8 | 1987 | 2.6 |
| 1977 | 18.0 | 1978 | 18.0 | 1979 | 8.3 | 1980 | 8.3 | 1981 | 7.0 | 1982 | 5.9 | 1983 | 5.9 | 1984 | 4.0 | 1985 | 2.8 | 1986 | 2.7 | 1987 | 2.6 | 1988 | 2.5 |
| 1978 | 17.9 | 1979 | 8.1 | 1980 | 8.1 | 1981 | 6.8 | 1982 | 5.7 | 1983 | 5.7 | 1984 | 3.9 | 1985 | 2.7 | 1986 | 2.7 | 1987 | 2.5 | 1988 | 2.5 | 1989 | 2.5 |
| 1979 | 7.9 | 1980 | 7.9 | 1981 | 6.7 | 1982 | 5.6 | 1983 | 5.6 | 1984 | 3.8 | 1985 | 2.7 | 1986 | 2.6 | 1987 | 2.5 | 1988 | 2.4 | 1989 | 2.4 | 1990 | 2.4 |
| 1980 | 7.7 | 1981 | 6.6 | 1982 | 5.5 | 1983 | 5.5 | 1984 | 3.7 | 1985 | 2.6 | 1986 | 2.6 | 1987 | 2.5 | 1988 | 2.4 | 1989 | 2.4 | 1990 | 2.4 | 1991 | 2.4 |
| 1981 | 6.4 | 1982 | 5.3 | 1983 | 5.3 | 1984 | 3.6 | 1985 | 2.6 | 1986 | 2.5 | 1987 | 2.4 | 1988 | 2.4 | 1989 | 2.4 | 1990 | 2.3 | 1991 | 2.3 | 1992 | 2.3 |
| 1982 | 5.2 | 1983 | 5.2 | 1984 | 3.5 | 1985 | 2.5 | 1986 | 2.5 | 1987 | 2.4 | 1988 | 2.3 | 1989 | 2.3 | 1990 | 2.3 | 1991 | 2.3 | 1992 | 2.3 | 1993 | 2.3 |
| 1983 | 5.0 | 1984 | 3.4 | 1985 | 2.4 | 1986 | 2.4 | 1987 | 2.3 | 1988 | 2.3 | 1989 | 2.3 | 1990 | 2.2 | 1991 | 2.2 | 1992 | 2.2 | 1993 | 2.2 | 1994 | 2.2 |
| 1984 | 3.3 | 1985 | 2.4 | 1986 | 2.3 | 1987 | 2.2 | 1988 | 2.2 | 1989 | 2.2 | 1990 | 2.2 | 1991 | 2.2 | 1992 | 2.2 | 1993 | 2.2 | 1994 | 2.2 | 1995 | 2.2 |
| 1985 | 2.3 | 1986 | 2.3 | 1987 | 2.2 | 1988 | 2.1 | 1989 | 2.1 | 1990 | 2.1 | 1991 | 2.1 | 1992 | 2.1 | 1993 | 2.1 | 1994 | 2.1 | 1995 | 2.1 | 1996 | 2.1 |
| 1986 | 2.2 | 1987 | 2.1 | 1988 | 2.1 | 1989 | 2.1 | 1990 | 2.0 | 1991 | 2.0 | 1992 | 2.0 | 1993 | 2.0 | 1994 | 2.0 | 1995 | 2.0 | 1996 | 2.0 | 1997 | 2.0 |
| 1987 | 2.0 | 1988 | 2.0 | 1989 | 2.0 | 1990 | 2.0 | 1991 | 2.0 | 1992 | 2.0 | 1993 | 2.0 | 1994 | 2.0 | 1995 | 2.0 | 1996 | 2.0 | 1997 | 2.0 | 1998 | 2.0 |
| 1988 | 1.9 | 1989 | 1.9 | 1990 | 1.9 | 1991 | 1.9 | 1992 | 1.9 | 1993 | 1.9 | 1994 | 1.9 | 1995 | 1.9 | 1996 | 1.9 | 1997 | 1.9 | 1998 | 1.9 | 1999 | 1.9 |
| 1989 | 1.8 | 1990 | 1.8 | 1991 | 1.8 | 1992 | 1.8 | 1993 | 1.8 | 1994 | 1.8 | 1995 | 1.8 | 1996 | 1.8 | 1997 | 1.8 | 1998 | 1.8 | 1999 | 1.8 | 2000 | 1.8 |
| 1990 | 1.7 | 1991 | 1.7 | 1992 | 1.7 | 1993 | 1.7 | 1994 | 1.7 | 1995 | 1.7 | 1996 | 1.7 | 1997 | 1.7 | 1998 | 1.7 | 1999 | 1.7 | 2000 | 1.7 | 2001 | 1.7 |
| 1991 | 1.6 | 1992 | 1.6 | 1993 | 1.6 | 1994 | 1.6 | 1995 | 1.6 | 1996 | 1.6 | 1997 | 1.6 | 1998 | 1.6 | 1999 | 1.6 | 2000 | 1.6 | 2001 | 1.6 | 2002 | 1.6 |
| 1992 | 1.5 | 1993 | 1.5 | 1994 | 1.5 | 1995 | 1.5 | 1996 | 1.5 | 1997 | 1.5 | 1998 | 1.5 | 1999 | 1.5 | 2000 | 1.5 | 2001 | 1.5 | 2002 | 1.5 | 2003 | 1.5 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.3.4.

TABLE 2.3.2B

DATE : MAY 25, 1985

## EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
## LIGHT DUTY GASOLINE POWERED TRUCKS II
## CO

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 182.5 | 1962 | 182.5 | 1963 | 182.5 | 1964 | 182.5 | 1965 | 182.5 | 1966 | 182.5 | 1967 | 182.5 | 1968 | 182.5 | 1969 | 182.5 | 1970 | 154.6 | 1971 | 154.6 | 1972 | 154.6 |
| 1962 | 181.5 | 1963 | 181.5 | 1964 | 181.5 | 1965 | 181.5 | 1966 | 181.5 | 1967 | 181.5 | 1968 | 181.5 | 1969 | 181.5 | 1970 | 153.4 | 1971 | 153.4 | 1972 | 153.4 | 1973 | 153.4 |
| 1963 | 180.4 | 1964 | 180.4 | 1965 | 180.4 | 1966 | 180.4 | 1967 | 180.4 | 1968 | 180.4 | 1969 | 180.4 | 1970 | 152.2 | 1971 | 152.2 | 1972 | 152.2 | 1973 | 152.2 | 1974 | 150.3 |
| 1964 | 179.3 | 1965 | 179.3 | 1966 | 179.3 | 1967 | 179.3 | 1968 | 179.3 | 1969 | 179.3 | 1970 | 150.9 | 1971 | 150.9 | 1972 | 150.9 | 1973 | 150.9 | 1974 | 149.0 | 1975 | 149.0 |
| 1965 | 178.0 | 1966 | 178.0 | 1967 | 178.0 | 1968 | 178.0 | 1969 | 178.0 | 1970 | 149.4 | 1971 | 149.4 | 1972 | 149.4 | 1973 | 149.4 | 1974 | 147.6 | 1975 | 147.6 | 1976 | 147.6 |
| 1966 | 176.6 | 1967 | 176.6 | 1968 | 176.6 | 1969 | 176.6 | 1970 | 147.9 | 1971 | 147.9 | 1972 | 147.9 | 1973 | 147.9 | 1974 | 146.1 | 1975 | 146.1 | 1976 | 146.1 | 1977 | 146.1 |
| 1967 | 175.1 | 1968 | 175.1 | 1969 | 175.1 | 1970 | 146.2 | 1971 | 146.2 | 1972 | 146.2 | 1973 | 146.2 | 1974 | 144.5 | 1975 | 144.5 | 1976 | 144.5 | 1977 | 144.5 | 1978 | 144.5 |
| 1968 | 173.5 | 1969 | 173.5 | 1970 | 144.4 | 1971 | 144.4 | 1972 | 144.4 | 1973 | 144.4 | 1974 | 142.8 | 1975 | 142.8 | 1976 | 142.8 | 1977 | 142.8 | 1978 | 142.8 | 1979 | 67.3 |
| 1969 | 171.8 | 1970 | 142.4 | 1971 | 142.4 | 1972 | 142.4 | 1973 | 142.4 | 1974 | 140.9 | 1975 | 140.9 | 1976 | 140.9 | 1977 | 140.9 | 1978 | 140.9 | 1979 | 65.3 | 1980 | 65.3 |
| 1970 | 140.2 | 1971 | 140.2 | 1972 | 140.2 | 1973 | 140.2 | 1974 | 138.8 | 1975 | 138.8 | 1976 | 138.8 | 1977 | 138.8 | 1978 | 138.8 | 1979 | 63.1 | 1980 | 63.1 | 1981 | 44.3 |
| 1971 | 137.9 | 1972 | 137.9 | 1973 | 137.9 | 1974 | 136.6 | 1975 | 136.6 | 1976 | 136.6 | 1977 | 136.6 | 1978 | 136.6 | 1979 | 60.8 | 1980 | 60.8 | 1981 | 43.3 | 1982 | 33.2 |
| 1972 | 135.4 | 1973 | 135.4 | 1974 | 134.2 | 1975 | 134.2 | 1976 | 134.2 | 1977 | 134.2 | 1978 | 134.2 | 1979 | 58.2 | 1980 | 58.2 | 1981 | 42.2 | 1982 | 32.1 | 1983 | 32.1 |
| 1973 | 132.7 | 1974 | 131.6 | 1975 | 131.6 | 1976 | 131.6 | 1977 | 131.6 | 1978 | 131.6 | 1979 | 55.4 | 1980 | 55.4 | 1981 | 40.9 | 1982 | 30.9 | 1983 | 30.9 | 1984 | 22.6 |
| 1974 | 128.7 | 1975 | 128.7 | 1976 | 128.7 | 1977 | 128.7 | 1978 | 128.7 | 1979 | 52.4 | 1980 | 52.4 | 1981 | 39.6 | 1982 | 29.6 | 1983 | 29.6 | 1984 | 21.5 | 1985 | 13.1 |
| 1975 | 125.7 | 1976 | 125.7 | 1977 | 125.7 | 1978 | 125.7 | 1979 | 49.2 | 1980 | 49.2 | 1981 | 38.2 | 1982 | 28.2 | 1983 | 28.2 | 1984 | 20.3 | 1985 | 12.5 | 1986 | 12.5 |
| 1976 | 122.4 | 1977 | 122.4 | 1978 | 122.4 | 1979 | 45.7 | 1980 | 45.7 | 1981 | 36.7 | 1982 | 26.6 | 1983 | 26.6 | 1984 | 18.9 | 1985 | 11.9 | 1986 | 11.9 | 1987 | 13.3 |
| 1977 | 118.8 | 1978 | 118.8 | 1979 | 41.9 | 1980 | 41.9 | 1981 | 35.0 | 1982 | 25.0 | 1983 | 25.0 | 1984 | 17.5 | 1985 | 11.1 | 1986 | 11.1 | 1987 | 12.0 | 1988 | 12.0 |
| 1978 | 114.9 | 1979 | 37.7 | 1980 | 37.7 | 1981 | 33.2 | 1982 | 23.2 | 1983 | 23.2 | 1984 | 15.9 | 1985 | 10.4 | 1986 | 10.4 | 1987 | 10.5 | 1988 | 10.5 | 1989 | 10.5 |
| 1979 | 33.3 | 1980 | 33.3 | 1981 | 31.3 | 1982 | 21.2 | 1983 | 21.2 | 1984 | 14.2 | 1985 | 9.5 | 1986 | 9.5 | 1987 | 9.0 | 1988 | 9.0 | 1989 | 9.0 | 1990 | 9.0 |
| 1980 | 30.3 | 1981 | 30.0 | 1982 | 19.9 | 1983 | 19.9 | 1984 | 13.1 | 1985 | 9.0 | 1986 | 9.0 | 1987 | 7.9 | 1988 | 7.9 | 1989 | 7.9 | 1990 | 7.9 | 1991 | 7.9 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 154.6 | 1974 | 152.5 | 1975 | 152.5 | 1976 | 152.5 | 1977 | 152.5 | 1978 | 152.5 | 1979 | 77.7 | 1980 | 77.7 | 1981 | 50.7 | 1982 | 40.6 | 1983 | 40.6 | 1984 | 31.0 |
| 1974 | 151.4 | 1975 | 151.4 | 1976 | 151.4 | 1977 | 151.4 | 1978 | 151.4 | 1979 | 76.5 | 1980 | 76.5 | 1981 | 50.1 | 1982 | 40.1 | 1983 | 40.1 | 1984 | 30.6 | 1985 | 17.7 |
| 1975 | 150.3 | 1976 | 150.3 | 1977 | 150.3 | 1978 | 150.3 | 1979 | 75.3 | 1980 | 75.3 | 1981 | 49.6 | 1982 | 39.6 | 1983 | 39.6 | 1984 | 30.1 | 1985 | 17.5 | 1986 | 17.5 |
| 1976 | 149.0 | 1977 | 149.0 | 1978 | 149.0 | 1979 | 73.9 | 1980 | 73.9 | 1981 | 49.0 | 1982 | 39.0 | 1983 | 39.0 | 1984 | 29.6 | 1985 | 17.2 | 1986 | 17.2 | 1987 | 23.2 |
| 1977 | 147.6 | 1978 | 147.6 | 1979 | 72.5 | 1980 | 72.5 | 1981 | 48.4 | 1982 | 38.3 | 1983 | 38.3 | 1984 | 29.1 | 1985 | 16.9 | 1986 | 16.9 | 1987 | 22.7 | 1988 | 22.7 |
| 1978 | 146.1 | 1979 | 70.9 | 1980 | 70.9 | 1981 | 47.7 | 1982 | 37.6 | 1983 | 37.6 | 1984 | 28.5 | 1985 | 16.6 | 1986 | 16.6 | 1987 | 22.2 | 1988 | 22.2 | 1989 | 22.2 |
| 1979 | 69.2 | 1980 | 69.2 | 1981 | 46.9 | 1982 | 36.9 | 1983 | 36.9 | 1984 | 27.8 | 1985 | 16.3 | 1986 | 16.3 | 1987 | 21.6 | 1988 | 21.6 | 1989 | 21.6 | 1990 | 21.6 |
| 1980 | 67.3 | 1981 | 46.1 | 1982 | 36.1 | 1983 | 36.1 | 1984 | 27.1 | 1985 | 16.0 | 1986 | 16.0 | 1987 | 20.9 | 1988 | 20.9 | 1989 | 20.9 | 1990 | 20.9 | 1991 | 20.9 |
| 1981 | 45.2 | 1982 | 35.2 | 1983 | 35.2 | 1984 | 26.4 | 1985 | 15.6 | 1986 | 15.6 | 1987 | 20.2 | 1988 | 20.2 | 1989 | 20.2 | 1990 | 20.2 | 1991 | 20.2 | 1992 | 20.2 |
| 1982 | 34.2 | 1983 | 34.2 | 1984 | 25.5 | 1985 | 15.2 | 1986 | 15.2 | 1987 | 19.4 | 1988 | 19.4 | 1989 | 19.4 | 1990 | 19.4 | 1991 | 19.4 | 1992 | 19.4 | 1993 | 19.4 |
| 1983 | 33.2 | 1984 | 24.6 | 1985 | 14.7 | 1986 | 14.7 | 1987 | 18.6 | 1988 | 18.6 | 1989 | 18.6 | 1990 | 18.6 | 1991 | 18.6 | 1992 | 18.6 | 1993 | 18.6 | 1994 | 18.6 |
| 1984 | 23.7 | 1985 | 14.2 | 1986 | 14.2 | 1987 | 17.7 | 1988 | 17.7 | 1989 | 17.7 | 1990 | 17.7 | 1991 | 17.7 | 1992 | 17.7 | 1993 | 17.7 | 1994 | 17.7 | 1995 | 17.7 |
| 1985 | 13.7 | 1986 | 13.7 | 1987 | 16.7 | 1988 | 16.7 | 1989 | 16.7 | 1990 | 16.7 | 1991 | 16.7 | 1992 | 16.7 | 1993 | 16.7 | 1994 | 16.7 | 1995 | 16.7 | 1996 | 16.7 |
| 1986 | 13.1 | 1987 | 15.7 | 1988 | 15.7 | 1989 | 15.7 | 1990 | 15.7 | 1991 | 15.7 | 1992 | 15.7 | 1993 | 15.7 | 1994 | 15.7 | 1995 | 15.7 | 1996 | 15.7 | 1997 | 15.7 |
| 1987 | 14.5 | 1988 | 14.5 | 1989 | 14.5 | 1990 | 14.5 | 1991 | 14.5 | 1992 | 14.5 | 1993 | 14.5 | 1994 | 14.5 | 1995 | 14.5 | 1996 | 14.5 | 1997 | 14.5 | 1998 | 14.5 |
| 1988 | 13.3 | 1989 | 13.3 | 1990 | 13.3 | 1991 | 13.3 | 1992 | 13.3 | 1993 | 13.3 | 1994 | 13.3 | 1995 | 13.3 | 1996 | 13.3 | 1997 | 13.3 | 1998 | 13.3 | 1999 | 13.3 |
| 1989 | 12.0 | 1990 | 12.0 | 1991 | 12.0 | 1992 | 12.0 | 1993 | 12.0 | 1994 | 12.0 | 1995 | 12.0 | 1996 | 12.0 | 1997 | 12.0 | 1998 | 12.0 | 1999 | 12.0 | 2000 | 12.0 |
| 1990 | 10.5 | 1991 | 10.5 | 1992 | 10.5 | 1993 | 10.5 | 1994 | 10.5 | 1995 | 10.5 | 1996 | 10.5 | 1997 | 10.5 | 1998 | 10.5 | 1999 | 10.5 | 2000 | 10.5 | 2001 | 10.5 |
| 1991 | 9.0 | 1992 | 9.0 | 1993 | 9.0 | 1994 | 9.0 | 1995 | 9.0 | 1996 | 9.0 | 1997 | 9.0 | 1998 | 9.0 | 1999 | 9.0 | 2000 | 9.0 | 2001 | 9.0 | 2002 | 9.0 |
| 1992 | 7.9 | 1993 | 7.9 | 1994 | 7.9 | 1995 | 7.9 | 1996 | 7.9 | 1997 | 7.9 | 1998 | 7.9 | 1999 | 7.9 | 2000 | 7.9 | 2001 | 7.9 | 2002 | 7.9 | 2003 | 7.9 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.3.4.

# TABLE 2.3.2C

DATE : MAY 25, 1985

## EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
## LIGHT DUTY GASOLINE POWERED TRUCKS II
## NOx

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 3.1 | 1962 | 3.1 | 1963 | 3.1 | 1964 | 3.1 | 1965 | 3.1 | 1966 | 3.1 | 1967 | 3.1 | 1968 | 3.1 | 1969 | 3.1 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 |
| 1962 | 3.1 | 1963 | 3.1 | 1964 | 3.1 | 1965 | 3.1 | 1966 | 3.1 | 1967 | 3.1 | 1968 | 3.1 | 1969 | 3.1 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 4.3 |
| 1963 | 3.1 | 1964 | 3.1 | 1965 | 3.1 | 1966 | 3.1 | 1967 | 3.1 | 1968 | 3.1 | 1969 | 3.1 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 4.3 | 1974 | 3.8 |
| 1964 | 3.1 | 1965 | 3.1 | 1966 | 3.1 | 1967 | 3.1 | 1968 | 3.1 | 1969 | 3.1 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 4.3 | 1974 | 3.7 | 1975 | 3.7 |
| 1965 | 3.1 | 1966 | 3.1 | 1967 | 3.1 | 1968 | 3.1 | 1969 | 3.1 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 4.3 | 1974 | 3.7 | 1975 | 3.7 | 1976 | 3.7 |
| 1966 | 3.1 | 1967 | 3.1 | 1968 | 3.1 | 1969 | 3.1 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 4.3 | 1974 | 3.7 | 1975 | 3.7 | 1976 | 3.7 | 1977 | 3.7 |
| 1967 | 3.1 | 1968 | 3.1 | 1969 | 3.1 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 4.3 | 1974 | 3.7 | 1975 | 3.7 | 1976 | 3.7 | 1977 | 3.7 | 1978 | 3.7 |
| 1968 | 3.1 | 1969 | 3.1 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 4.3 | 1974 | 3.6 | 1975 | 3.6 | 1976 | 3.6 | 1977 | 3.6 | 1978 | 3.6 | 1979 | 2.3 |
| 1969 | 3.1 | 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 4.3 | 1974 | 3.6 | 1975 | 3.6 | 1976 | 3.6 | 1977 | 3.6 | 1978 | 3.6 | 1979 | 2.3 | 1980 | 2.3 |
| 1970 | 4.3 | 1971 | 4.3 | 1972 | 4.3 | 1973 | 4.3 | 1974 | 3.6 | 1975 | 3.6 | 1976 | 3.6 | 1977 | 3.6 | 1978 | 3.6 | 1979 | 2.2 | 1980 | 2.2 | 1981 | 2.2 |
| 1971 | 4.3 | 1972 | 4.3 | 1973 | 4.3 | 1974 | 3.5 | 1975 | 3.5 | 1976 | 3.5 | 1977 | 3.5 | 1978 | 3.5 | 1979 | 2.1 | 1980 | 2.1 | 1981 | 2.1 | 1982 | 2.8 |
| 1972 | 4.3 | 1973 | 4.3 | 1974 | 3.5 | 1975 | 3.5 | 1976 | 3.5 | 1977 | 3.5 | 1978 | 3.5 | 1979 | 2.0 | 1980 | 2.0 | 1981 | 2.0 | 1982 | 2.7 | 1983 | 2.7 |
| 1973 | 4.3 | 1974 | 3.5 | 1975 | 3.5 | 1976 | 3.5 | 1977 | 3.5 | 1978 | 3.5 | 1979 | 1.9 | 1980 | 1.9 | 1981 | 1.9 | 1982 | 2.6 | 1983 | 2.6 | 1984 | 2.6 |
| 1974 | 3.4 | 1975 | 3.4 | 1976 | 3.4 | 1977 | 3.4 | 1978 | 3.4 | 1979 | 1.8 | 1980 | 1.8 | 1981 | 1.8 | 1982 | 2.5 | 1983 | 2.5 | 1984 | 2.5 | 1985 | 2.1 |
| 1975 | 3.4 | 1976 | 3.4 | 1977 | 3.4 | 1978 | 3.4 | 1979 | 1.7 | 1980 | 1.7 | 1981 | 1.7 | 1982 | 2.4 | 1983 | 2.4 | 1984 | 2.4 | 1985 | 2.0 | 1986 | 2.0 |
| 1976 | 3.3 | 1977 | 3.3 | 1978 | 3.3 | 1979 | 1.6 | 1980 | 1.6 | 1981 | 1.6 | 1982 | 2.3 | 1983 | 2.3 | 1984 | 2.3 | 1985 | 2.0 | 1986 | 2.0 | 1987 | 1.1 |
| 1977 | 3.3 | 1978 | 3.3 | 1979 | 1.4 | 1980 | 1.4 | 1981 | 1.4 | 1982 | 2.2 | 1983 | 2.2 | 1984 | 2.2 | 1985 | 1.9 | 1986 | 1.9 | 1987 | 1.0 | 1988 | 1.0 |
| 1978 | 3.2 | 1979 | 1.3 | 1980 | 1.3 | 1981 | 1.3 | 1982 | 2.0 | 1983 | 2.0 | 1984 | 2.0 | 1985 | 1.9 | 1986 | 1.9 | 1987 | 1.0 | 1988 | 1.0 | 1989 | 1.0 |
| 1979 | 1.1 | 1980 | 1.1 | 1981 | 1.1 | 1982 | 1.9 | 1983 | 1.9 | 1984 | 1.9 | 1985 | 1.8 | 1986 | 1.8 | 1987 | 0.9 | 1988 | 0.9 | 1989 | 0.9 | 1990 | 0.9 |
| 1980 | 1.0 | 1981 | 1.0 | 1982 | 1.8 | 1983 | 1.8 | 1984 | 1.8 | 1985 | 1.7 | 1986 | 1.7 | 1987 | 0.9 | 1988 | 0.9 | 1989 | 0.9 | 1990 | 0.9 | 1991 | 0.9 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 4.3 | 1974 | 3.8 | 1975 | 3.8 | 1976 | 3.8 | 1977 | 3.8 | 1978 | 3.8 | 1979 | 2.7 | 1980 | 2.7 | 1981 | 2.7 | 1982 | 3.4 | 1983 | 3.4 | 1984 | 3.4 |
| 1974 | 3.8 | 1975 | 3.8 | 1976 | 3.8 | 1977 | 3.8 | 1978 | 3.8 | 1979 | 2.6 | 1980 | 2.6 | 1981 | 2.6 | 1982 | 3.4 | 1983 | 3.4 | 1984 | 3.4 | 1985 | 2.5 |
| 1975 | 3.8 | 1976 | 3.8 | 1977 | 3.8 | 1978 | 3.8 | 1979 | 2.6 | 1980 | 2.6 | 1981 | 2.6 | 1982 | 3.3 | 1983 | 3.3 | 1984 | 3.3 | 1985 | 2.4 | 1986 | 2.4 |
| 1976 | 3.7 | 1977 | 3.7 | 1978 | 3.7 | 1979 | 2.6 | 1980 | 2.6 | 1981 | 2.6 | 1982 | 3.3 | 1983 | 3.3 | 1984 | 3.3 | 1985 | 2.4 | 1986 | 2.4 | 1987 | 1.5 |
| 1977 | 3.7 | 1978 | 3.7 | 1979 | 2.5 | 1980 | 2.5 | 1981 | 2.5 | 1982 | 3.2 | 1983 | 3.2 | 1984 | 3.2 | 1985 | 2.4 | 1986 | 2.4 | 1987 | 1.5 | 1988 | 1.5 |
| 1978 | 3.7 | 1979 | 2.5 | 1980 | 2.5 | 1981 | 2.5 | 1982 | 3.2 | 1983 | 3.2 | 1984 | 3.2 | 1985 | 2.4 | 1986 | 2.4 | 1987 | 1.5 | 1988 | 1.5 | 1989 | 1.5 |
| 1979 | 2.4 | 1980 | 2.4 | 1981 | 2.4 | 1982 | 3.1 | 1983 | 3.1 | 1984 | 3.1 | 1985 | 2.3 | 1986 | 2.3 | 1987 | 1.5 | 1988 | 1.5 | 1989 | 1.5 | 1990 | 1.5 |
| 1980 | 2.3 | 1981 | 2.3 | 1982 | 3.0 | 1983 | 3.0 | 1984 | 3.0 | 1985 | 2.3 | 1986 | 2.3 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 | 1991 | 1.4 |
| 1981 | 2.3 | 1982 | 3.0 | 1983 | 3.0 | 1984 | 3.0 | 1985 | 2.3 | 1986 | 2.3 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 | 1991 | 1.4 | 1992 | 1.4 |
| 1982 | 2.9 | 1983 | 2.9 | 1984 | 2.9 | 1985 | 2.3 | 1986 | 2.3 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 | 1991 | 1.4 | 1992 | 1.4 | 1993 | 1.4 |
| 1983 | 2.8 | 1984 | 2.8 | 1985 | 2.2 | 1986 | 2.2 | 1987 | 1.3 | 1988 | 1.3 | 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 | 1993 | 1.3 | 1994 | 1.3 |
| 1984 | 2.7 | 1985 | 2.2 | 1986 | 2.2 | 1987 | 1.3 | 1988 | 1.3 | 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 | 1993 | 1.3 | 1994 | 1.3 | 1995 | 1.3 |
| 1985 | 2.1 | 1986 | 2.1 | 1987 | 1.3 | 1988 | 1.3 | 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 | 1993 | 1.3 | 1994 | 1.3 | 1995 | 1.3 | 1996 | 1.3 |
| 1986 | 2.1 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 | 1991 | 1.2 | 1992 | 1.2 | 1993 | 1.2 | 1994 | 1.2 | 1995 | 1.2 | 1996 | 1.2 | 1997 | 1.2 |
| 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 | 1991 | 1.2 | 1992 | 1.2 | 1993 | 1.2 | 1994 | 1.2 | 1995 | 1.2 | 1996 | 1.2 | 1997 | 1.2 | 1998 | 1.2 |
| 1988 | 1.1 | 1989 | 1.1 | 1990 | 1.1 | 1991 | 1.1 | 1992 | 1.1 | 1993 | 1.1 | 1994 | 1.1 | 1995 | 1.1 | 1996 | 1.1 | 1997 | 1.1 | 1998 | 1.1 | 1999 | 1.1 |
| 1989 | 1.0 | 1990 | 1.0 | 1991 | 1.0 | 1992 | 1.0 | 1993 | 1.0 | 1994 | 1.0 | 1995 | 1.0 | 1996 | 1.0 | 1997 | 1.0 | 1998 | 1.0 | 1999 | 1.0 | 2000 | 1.0 |
| 1990 | 1.0 | 1991 | 1.0 | 1992 | 1.0 | 1993 | 1.0 | 1994 | 1.0 | 1995 | 1.0 | 1996 | 1.0 | 1997 | 1.0 | 1998 | 1.0 | 1999 | 1.0 | 2000 | 1.0 | 2001 | 1.0 |
| 1991 | 0.9 | 1992 | 0.9 | 1993 | 0.9 | 1994 | 0.9 | 1995 | 0.9 | 1996 | 0.9 | 1997 | 0.9 | 1998 | 0.9 | 1999 | 0.9 | 2000 | 0.9 | 2001 | 0.9 | 2002 | 0.9 |
| 1992 | 0.9 | 1993 | 0.9 | 1994 | 0.9 | 1995 | 0.9 | 1996 | 0.9 | 1997 | 0.9 | 1998 | 0.9 | 1999 | 0.9 | 2000 | 0.9 | 2001 | 0.9 | 2002 | 0.9 | 2003 | 0.9 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.3.4.

# TABLE 2.3.3

# IDLE EMISSION RATES FOR
# HIGH ALTITUDE
# LIGHT DUTY GASOLINE POWERED TRUCKS II

* IER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Min.) | Deterioration Rate (Gm/Min/10K Mi) |
|---|---|---|---|
| HC | Pre-1970 | 2.06 | 0.03 |
| | 1970-1973 | 1.09 | 0.04 |
| | 1974-1978 | 1.09 | 0.03 |
| | 1979-1980 | 0.06 | 0.02 |
| | 1981 | 0.10 | 0.02 |
| | 1982-1983 | 0.07 | 0.02 |
| | 1984 | 0.04 | 0.01 |
| | 1985-1986 | 0.04 | 0.01 |
| | 1987+ | 0.04 | 0.01 |
| CO | Pre-1970 | 22.04 | 0.45 |
| | 1970-1973 | 12.74 | 0.52 |
| | 1974-1978 | 12.74 | 0.49 |
| | 1979-1980 | 1.52 | 0.32 |
| | 1981 | 2.27 | 0.27 |
| | 1982-1983 | 1.72 | 0.24 |
| | 1984 | 0.69 | 0.14 |
| | 1985-1986 | 0.49 | 0.28 |
| | 1987+ | 0.49 | 0.28 |
| NOx | Pre-1970 | 0.10 | 0.0 |
| | 1970-1973 | 0.05 | 0.0 |
| | 1974-1978 | 0.04 | 0.0 |
| | 1979-1980 | 0.01 | 0.0 |
| | 1981 | 0.06 | 0.0 |
| | 1982-1983 | 0.06 | 0.0 |
| | 1984 | 0.05 | 0.0 |
| | 1985-1986 | 0.02 | 0.0 |
| | 1987+ | 0.02 | 0.0 |

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

DATE : MAY 25, 1985

## TABLE 2.3.4

## REGISTRATION MIX AND MILEAGE ACCUMULATION RATES FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS II

| Model Year Index** | July 1 Registration Mix* | Mileage Accumulation Rate per truck * | Jan 1 Registration Mix | Jan 1 Mileage Accumulation Rate (fleet) | Jan 1 Mileage Accumulation (fleet) |
|---|---|---|---|---|---|
| 1 | 0.067 | 18352. | 0.022 | 18352. | 2294. |
| 2 | 0.085 | 16946. | 0.085 | 18000. | 13720. |
| 3 | 0.081 | 15648. | 0.081 | 16621. | 31021. |
| 4 | 0.077 | 14449. | 0.077 | 15348. | 46997. |
| 5 | 0.073 | 13342. | 0.073 | 14172. | 61748. |
| 6 | 0.069 | 12320. | 0.069 | 13086. | 75370. |
| 7 | 0.065 | 11376. | 0.065 | 12084. | 87947. |
| 8 | 0.061 | 10504. | 0.061 | 11158. | 99562. |
| 9 | 0.057 | 9700. | 0.057 | 10303. | 110286. |
| 10 | 0.053 | 8956. | 0.053 | 9514. | 120188. |
| 11 | 0.048 | 8270. | 0.048 | 8784. | 129332. |
| 12 | 0.044 | 7637. | 0.044 | 8112. | 137775. |
| 13 | 0.040 | 7052. | 0.040 | 7491. | 145572. |
| 14 | 0.036 | 6511. | 0.036 | 6917. | 152771. |
| 15 | 0.032 | 6012. | 0.032 | 6386. | 159419. |
| 16 | 0.028 | 5552. | 0.028 | 5897. | 165557. |
| 17 | 0.024 | 5126. | 0.024 | 5445. | 171225. |
| 18 | 0.020 | 4734. | 0.020 | 5028. | 176458. |
| 19 | 0.016 | 4371. | 0.016 | 4643. | 181291. |
| 20+ | 0.024 | 4036. | 0.024 | 4287. | 185753. |

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

DATE : MAY 25, 1985

## TABLE 2.3.5

## EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR HIGH ALTITUDE
## LIGHT DUTY GASOLINE POWERED TRUCKS II
## JANUARY 1, 1988

| Model Years | (A) LDT2 Fleet Registration | (B) Sales Fraction | (A*B) | (C=A*B/DAF) LDGT2 Registration | (D) Annual Mileage Accrual Rate | (C*D) | (C*D/TFNORM) Travel Fractions |
|---|---|---|---|---|---|---|---|
| 1988 | 0.022 | 0.760 | 0.017 | 0.019 | 18352. | 355.7 | 0.032 |
| 1987 | 0.085 | 0.790 | 0.067 | 0.077 | 18000. | 1380.3 | 0.123 |
| 1986 | 0.081 | 0.820 | 0.066 | 0.076 | 16621. | 1260.7 | 0.112 |
| 1985 | 0.077 | 0.840 | 0.065 | 0.074 | 15348. | 1133.6 | 0.101 |
| 1984 | 0.073 | 0.870 | 0.064 | 0.073 | 14172. | 1027.8 | 0.091 |
| 1983 | 0.069 | 0.900 | 0.062 | 0.071 | 13086. | 928.0 | 0.083 |
| 1982 | 0.065 | 0.920 | 0.060 | 0.068 | 12084. | 825.2 | 0.073 |
| 1981 | 0.061 | 0.940 | 0.057 | 0.065 | 11158. | 730.6 | 0.065 |
| 1980 | 0.057 | 0.966 | 0.055 | 0.063 | 10303. | 647.8 | 0.058 |
| 1979 | 0.053 | 0.972 | 0.052 | 0.059 | 9514. | 559.7 | 0.050 |
| 1978 | 0.048 | 0.991 | 0.048 | 0.054 | 8784. | 477.2 | 0.042 |
| 1977 | 0.044 | 0.995 | 0.044 | 0.050 | 8112. | 405.5 | 0.036 |
| 1976 | 0.040 | 0.997 | 0.040 | 0.046 | 7491. | 341.1 | 0.030 |
| 1975 | 0.036 | 0.998 | 0.036 | 0.041 | 6917. | 283.8 | 0.025 |
| 1974 | 0.032 | 1.000 | 0.032 | 0.037 | 6386. | 233.4 | 0.021 |
| 1973 | 0.028 | 1.000 | 0.028 | 0.032 | 5897. | 188.6 | 0.017 |
| 1972 | 0.024 | 1.000 | 0.024 | 0.027 | 5445. | 149.2 | 0.013 |
| 1971 | 0.020 | 1.000 | 0.020 | 0.023 | 5028. | 114.8 | 0.010 |
| 1970 | 0.016 | 1.000 | 0.016 | 0.018 | 4643. | 84.8 | 0.008 |
| 1969- | 0.024 | 1.000 | 0.024 | 0.027 | 4287. | 117.5 | 0.010 |
|  |  | DAF: | 0.876 |  | TFNORM: | 11245.4 |  |

WHERE :

A = January 1 registration mix from Table 2.3.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 2.3.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI) = .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

NOTE : In general, the travel weighting fractions will change for every calendar year since the sales fraction (column B) changes for almost every model year.

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## TABLE 2.3.6

## SPEED CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS II

* SCF(s,sadj) = SF(s)/SF(sadj)

$$SF(s) = EXP(A + B*s + C*s^2 + D*S^3 + E*s^4 + F*s^5),\ HC\ \&\ CO$$
$$= A + B*s + C*s^2 + D*s^3 + E*s^4 + F*s^5,\ NOx$$

| Pollutant and Model Years | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| HC | | | | | | |
| Pre-1970 | 0.224612E+01 | -0.290973E+00 | 0.158890E-01 | -0.472494E-03 | 0.694077E-05 | -0.392798E-07 |
| 1970-1973 | 0.215361E+01 | -0.283451E+00 | 0.156948E-01 | -0.469759E-03 | 0.693832E-05 | -0.394707E-07 |
| 1974-1978 | 0.211340E+01 | -0.285676E+00 | 0.163180E-01 | -0.500793E-03 | 0.755067E-05 | -0.437187E-07 |
| 1979+ | 0.239540E+01 | -0.335781E+00 | 0.211609E-01 | -0.731550E-03 | 0.120715E-04 | -0.748566E-07 |
| CO | | | | | | |
| Pre-1970 | 0.181978E+01 | -0.254663E+00 | 0.152347E-01 | -0.487397E-03 | 0.758207E-05 | -0.449514E-07 |
| 1970-1973 | 0.231868E+01 | -0.341147E+00 | 0.209446E-01 | -0.665891E-03 | 0.102225E-04 | -0.598264E-07 |
| 1974-1978 | 0.215487E+01 | -0.329116E+00 | 0.210112E-01 | -0.689057E-03 | 0.108390E-04 | -0.647125E-07 |
| 1979+ | 0.248747E+01 | -0.391562E+00 | 0.270721E-01 | -0.976178E-03 | 0.165270E-04 | -0.104317E-06 |
| NOx | | | | | | |
| Pre-1970 | 0.244424E+01 | -0.250107E+00 | 0.138293E-01 | -0.287025E-03 | 0.207585E-05 | 0.0 |
| 1970-1973 | 0.144825E+01 | -0.122444E+00 | 0.795024E-02 | -0.171078E-03 | 0.125777E-05 | 0.0 |
| 1974-1978 | 0.153447E+01 | -0.125671E+00 | 0.785919E-02 | -0.169428E-03 | 0.125494E-05 | 0.0 |
| 1979+ | 0.942131E+00 | -0.423240E-01 | 0.386253E-02 | -0.939853E-04 | 0.753883E-06 | 0.0 |

* WHERE : s = average speed (mph)
sadj = basic test procedure speed; adjusted for fraction of cold start operation x and fraction of hot start operation w, [ 1/sadj = (w+x)/26 + (1-w-x)/16 ]

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## TABLE 2.3.7A

## TEMPERATURE CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS II

* TCF(b) = EXP( TC(b) * (T - 75.0))

| Pol | Model Years | Test segment 1 |  | Test segment 2 |  | Test segment 3 |  |
|---|---|---|---|---|---|---|---|
|  |  | TC Low | TC High | TC Low | TC High | TC Low | TC High |
| HC | Pre-1970 | -0.20623E-01 | -0.14381E-01 | -0.24032E-02 | 0.13219E-02 | -0.10081E-02 | 0.34799E-02 |
|  | 1970-1973 | -0.24462E-01 | -0.12552E-01 | -0.32017E-02 | 0.42667E-02 | -0.86884E-03 | 0.75843E-02 |
|  | 1974-1978 | -0.21255E-01 | -0.10888E-01 | -0.52755E-03 | -0.47925E-03 | 0.93659E-03 | 0.76666E-02 |
|  | 1979-1983 | -0.23517E-01 | -0.14095E-01 | -0.88057E-02 | 0.26179E-01 | -0.16222E-02 | 0.24297E-01 |
|  | 1984-1987 | -0.27793E-01 | -0.14095E-01 | -0.10177E-01 | 0.26179E-01 | -0.82680E-02 | 0.24297E-01 |
|  | 1988+ | -0.33883E-01 | 0.11959E-01 | -0.10113E-01 | -0.12627E-04 | -0.80650E-02 | 0.78765E-02 |
| CO | Pre-1970 | -0.13487E-01 | -0.14691E-01 | 0.15784E-02 | 0.37462E-02 | 0.11097E-02 | 0.11014E-01 |
|  | 1970-1973 | -0.21126E-01 | -0.38767E-01 | -0.15289E-02 | 0.84685E-02 | 0.15749E-02 | 0.25179E-01 |
|  | 1974-1978 | -0.20843E-01 | -0.21165E-01 | -0.59951E-02 | 0.23603E-01 | 0.18253E-02 | 0.28483E-01 |
|  | 1979-1983 | -0.24835E-01 | -0.19612E-01 | -0.88336E-02 | 0.48537E-01 | -0.11553E-02 | 0.31439E-01 |
|  | 1984-1987 | see NOTE 2 | -0.19612E-01 | -0.17783E-01 | 0.48537E-01 | -0.10871E-01 | 0.31439E-01 |
|  | 1988+ | see NOTE 2 | -0.12596E-01 | -0.18813E-01 | 0.13861E-01 | -0.11951E-01 | 0.96939E-02 |
| NOx | Pre-1970 | -0.16897E-03 | 0.38841E-02 | -0.89245E-02 | -0.87325E-02 | -0.72580E-02 | -0.10839E-01 |
|  | 1970-1973 | -0.25074E-03 | -0.10389E-02 | -0.59791E-02 | -0.92466E-02 | -0.62690E-02 | -0.10108E-01 |
|  | 1974-1978 | 0.38855E-02 | -0.18301E-01 | -0.24156E-02 | -0.10925E-01 | -0.21188E-02 | -0.18042E-01 |
|  | 1979-1987 | -0.76044E-02 | -0.26153E-01 | -0.68045E-02 | -0.18603E-01 | -0.54198E-02 | -0.20878E-01 |
|  | 1988+ | -0.53710E-02 | -0.34416E-01 | -0.65050E-02 | -0.35871E-01 | -0.85650E-02 | -0.28830E-01 |

* WHERE :

TCF(b) = Temperature correction factor for appropriate pollutant, ambient temperature, and model year; for test segment b
T = Ambient temperature (Fahrenheit)
TC(b) = Temperature correction factor coefficient for appropriate pollutant, reference temperature and model year; for test segment b
75.0 = Reference temperature

NOTE 1 : The temperature correction factor is used in conjunction with the Ripstwxn correction factor given in Table 2.3.7B.

NOTE 2 : Offset model used for Bag 1 CO. Offset = -1.3812*(T - 75.0).

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## TABLE 2.3.7B

### NORMALIZED BAG FRACTIONS FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS II

| | | Normalized Fractions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Pol | Model Years | Test | Seg.#1 | Test | Seg.#2 | Test | Seg.#3 | Total | Test |
| | | B1 | D1 | B2 | D2 | B3 | D3 | BO | DO |
| HC | Pre-1970 | 1.282 | 0.025 | 0.973 | 0.028 | 0.839 | 0.019 | 1.000 | 0.025 |
| | 1970-1973 | 1.345 | 0.074 | 0.946 | 0.054 | 0.842 | 0.048 | 1.000 | 0.056 |
| | 1974-1978 | 1.398 | 0.060 | 0.885 | 0.055 | 0.919 | 0.036 | 1.000 | 0.051 |
| | 1979-1983 | 1.860 | 0.345 | 0.766 | 0.234 | 0.804 | 0.196 | 1.000 | 0.243 |
| | 1984-1986 | 2.200 | 0.714 | 0.571 | 0.171 | 0.914 | 0.143 | 1.000 | 0.286 |
| | 1987+ | 2.634 | 1.104 | 0.368 | 0.499 | 0.973 | 0.391 | 1.000 | 0.594 |
| CO | Pre-1970 | 1.277 | 0.033 | 1.017 | 0.029 | 0.758 | 0.025 | 1.000 | 0.029 |
| | 1970-1973 | 1.442 | 0.071 | 0.996 | 0.042 | 0.674 | 0.033 | 1.000 | 0.046 |
| | 1974-1978 | 1.573 | 0.054 | 0.902 | 0.079 | 0.755 | 0.029 | 1.000 | 0.060 |
| | 1979-1983 | 1.972 | 0.176 | 0.881 | 0.157 | 0.628 | 0.109 | 1.000 | 0.139 |
| | 1984-1986 | 2.438 | 0.282 | 0.658 | 0.062 | 0.621 | 0.077 | 1.000 | 0.111 |
| | 1987+ | 3.941 | 2.009 | 0.0 | 1.186 | 0.689 | 1.014 | 1.000 | 1.308 |
| NOx | Pre-1970 | 1.121 | 0.009 | 0.785 | 0.001 | 1.319 | -0.009 | 1.000 | 0.0 |
| | 1970-1973 | 1.199 | -0.004 | 0.793 | -0.002 | 1.245 | 0.006 | 1.000 | 0.0 |
| | 1974-1978 | 1.262 | 0.022 | 0.770 | 0.004 | 1.242 | 0.027 | 1.000 | 0.014 |
| | 1979-1986 | 1.372 | 0.040 | 0.766 | 0.046 | 1.167 | 0.063 | 1.000 | 0.051 |
| | 1987+ | 1.830 | 0.169 | 0.703 | 0.149 | 0.939 | 0.222 | 1.000 | 0.173 |

NOTE : The fractions given in this table are used in the calculation of the operating-mode/ temperature correction factor (OMTCF).

WHERE : OMTCF = ((TERM1 + TERM2 + TERM3)/DENOM)
TERM1 = W *TCF(1)*(B1+D1*M)
TERM2 = (1-W-X)*TCF(2)*(B2+D2*M)
TERM3 = X *TCF(3)*(B3+D3*M)
DENOM = BO + DO*M
W = Fraction of VMT in the cold start mode
X = Fraction of VMT in the hot start mode
TCF(b) = Temperature correction factor for pollutant, model year; for test segment b
M = Cumulative mileage / 10,000

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## TABLE 2.3.8A

## AIR CONDITIONING CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS II

* ACCF= U*V*(A + B*(T-75) -1) + 1

| Model | HC | | CO | | NOx | |
|---|---|---|---|---|---|---|
| Years | A | B | A | B | A | B |
| Pre-1979 | 0.1023E+01 | 0.3344E-02 | 0.1202E+01 | 0.1808E-02 | 0.1299E+01 | 0.5643E-04 |
| 1979+ | 0.1000E+01 | 0.3512E-02 | 0.1130E+01 | 0.1528E-02 | 0.1221E+01 | 0.4262E-03 |

* WHERE :

ACCF = Air Conditioning Correction Factor
V = Fraction of vehicles which are equipped with AC given in Table 2.3.8B
U = Fraction of vehicles with AC that are using it = (DI-DILO)/(DIHI-DI), 0<=U<=1
DI = Discomfort index = (DB+WB)*.4+15
DILO = The highest discomfort index where no AC is used
DIHI = The lowest discomfort index where all vehicles with AC use it
DB = Dry bulb temperature (Fahrenheit)
WB = Wet bulb temperature (Fahrenheit)
T = Ambient temperature (Fahrenheit)

## TABLE 2.3.8B

## ESTIMATED FRACTION OF HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS II EQUIPPED WITH AIR CONDITIONING

| Model Years | Fraction Equipped With Air Conditioning |
|---|---|
| Pre-1977 | 0.32 |
| 1977 | 0.52 |
| 1978+ | 0.39 |

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## TABLE 2.3.9

## EXTRA LOAD CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS II

* XLCF = (XLC-1)*U + 1

| Model Years | Coefficients (XLC) HC | CO | NOx |
|---|---|---|---|
| Pre-1970 | 1.0786 | 1.2765 | 0.9535 |
| 1970-1973 | 1.0495 | 1.1384 | 1.0313 |
| 1974-1978 | 1.0556 | 1.1347 | 1.0753 |
| 1979+ | 1.0455 | 1.3058 | 1.0719 |

* WHERE :

XLCF = Extra load correction factor
U = Fraction of VMT with an extra load
XLC = Correction factor coefficient

## TABLE 2.3.10

## TRAILER TOWING CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE LIGHT DUTY GASOLINE POWERED TRUCKS II

* TTCF = (TTC-1)*U + 1

| Model Years | Coefficients (TTC) HC | CO | NOx |
|---|---|---|---|
| Pre-1970 | 1.2614 | 1.9327 | 1.1184 |
| 1970-1973 | 1.2762 | 1.8940 | 1.1384 |
| 1974-1978 | 1.7288 | 2.1414 | 1.2170 |
| 1979+ | 1.5909 | 3.9722 | 1.3875 |

* WHERE :

TTCF = Trailer towing correction factor
U = Fraction of VMT towing a trailer
TTC = Correction factor coefficient

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TABLE 2.4.1A

## EXHAUST EMISSION RATES FOR HIGH ALTITUDE HEAVY DUTY GASOLINE POWERED VEHICLES (RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Mile) | Deterioration Rate (Gm/Mi/10K Mi) | 50,000 Mile Emission Level (Grams/Mile) |
|---|---|---|---|---|
| HC | Pre-1963 | 22.46 | 0.31 | 24.01 |
| | 1963-1969 | 23.28 | 0.32 | 24.88 |
| | 1970-1973 | 12.55 | 0.37 | 14.40 |
| | 1974-1977 | 11.28 | 0.22 | 12.38 |
| | 1978 | 9.96 | 0.19 | 10.91 |
| | 1979-1980 | 4.18 | 0.19 | 5.13 |
| | 1981-1982 | 3.90 | 0.17 | 4.75 |
| | 1983 | 3.85 | 0.17 | 4.70 |
| | 1984 | 3.87 | 0.17 | 4.72 |
| | 1985 | 3.34 | 0.06 | 3.64 |
| | 1986 | 2.94 | 0.06 | 3.24 |
| | 1987-1990 | 1.60 | 0.09 | 2.05 |
| | 1991-1993 | 1.56 | 0.08 | 1.96 |
| | 1994-1996 | 1.52 | 0.08 | 1.92 |
| | 1997+ | 1.49 | 0.08 | 1.89 |
| CO | Pre-1963 | 360.04 | 4.81 | 384.09 |
| | 1963-1969 | 373.12 | 4.99 | 398.07 |
| | 1970-1973 | 282.36 | 6.68 | 315.76 |
| | 1974-1977 | 253.67 | 5.74 | 282.37 |
| | 1978 | 223.94 | 5.07 | 249.29 |
| | 1979-1980 | 187.87 | 4.83 | 212.02 |
| | 1981-1982 | 175.19 | 4.50 | 197.69 |
| | 1983 | 173.09 | 4.45 | 195.34 |
| | 1984 | 174.18 | 4.47 | 196.53 |
| | 1985 | 68.67 | 0.92 | 73.27 |
| | 1986 | 54.59 | 0.93 | 59.24 |
| | 1987-1990 | 34.41 | 0.58 | 37.31 |
| | 1991-1993 | 33.68 | 0.57 | 36.53 |
| | 1994-1996 | 32.77 | 0.55 | 35.52 |
| | 1997+ | 32.14 | 0.54 | 34.84 |
| NOx | Pre-1963 | 5.24 | 0.0 | 5.24 |
| | 1963-1969 | 5.43 | 0.0 | 5.43 |
| | 1970-1973 | 6.23 | 0.0 | 6.23 |
| | 1974-1977 | 4.08 | 0.07 | 4.43 |
| | 1978 | 3.60 | 0.06 | 3.90 |
| | 1979-1980 | 3.43 | 0.06 | 3.73 |
| | 1981-1982 | 3.20 | 0.06 | 3.50 |
| | 1983 | 3.16 | 0.06 | 3.46 |
| | 1984 | 3.18 | 0.06 | 3.48 |
| | 1985 | 3.19 | 0.03 | 3.34 |
| | 1986 | 3.21 | 0.03 | 3.36 |
| | 1987-1990 | 3.64 | 0.10 | 4.14 |
| | 1991-1993 | 3.56 | 0.09 | 4.01 |
| | 1994-1996 | 3.46 | 0.09 | 3.91 |
| | 1997+ | 3.40 | 0.09 | 3.85 |

* WHERE :
BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

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## TABLE 2.4.1B

### EXHAUST EMISSION RATES FOR
### HIGH ALTITUDE
### HEAVY DUTY GASOLINE POWERED VEHICLES
### AT VARIOUS MILEAGE INTERVALS
### (RATES INCLUDE TAMPERING)

| | Model | Emission Rate (Grams/Mile) | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Pol | Years | 0K | 20K | 40K | 60K | 80K | 100K | 120K | 140K |
| HC | Pre-1963 | 22.46 | 23.08 | 23.70 | 24.32 | 24.94 | 25.56 | 26.18 | 26.80 |
| | 1963-1969 | 23.28 | 23.92 | 24.56 | 25.20 | 25.84 | 26.48 | 27.12 | 27.76 |
| | 1970-1973 | 12.55 | 13.29 | 14.03 | 14.77 | 15.51 | 16.25 | 16.99 | 17.73 |
| | 1974-1977 | 11.28 | 11.72 | 12.16 | 12.60 | 13.04 | 13.48 | 13.92 | 14.36 |
| | 1978 | 9.96 | 10.34 | 10.72 | 11.10 | 11.48 | 11.86 | 12.24 | 12.62 |
| | 1979-1980 | 4.18 | 4.56 | 4.94 | 5.32 | 5.70 | 6.08 | 6.46 | 6.84 |
| | 1981-1982 | 3.90 | 4.24 | 4.58 | 4.92 | 5.26 | 5.60 | 5.94 | 6.28 |
| | 1983 | 3.85 | 4.19 | 4.53 | 4.87 | 5.21 | 5.55 | 5.89 | 6.23 |
| | 1984 | 3.87 | 4.21 | 4.55 | 4.89 | 5.23 | 5.57 | 5.91 | 6.25 |
| | 1985 | 3.34 | 3.46 | 3.58 | 3.70 | 3.82 | 3.94 | 4.06 | 4.18 |
| | 1986 | 2.94 | 3.06 | 3.18 | 3.30 | 3.42 | 3.54 | 3.66 | 3.78 |
| | 1987-1990 | 2.05 | 2.36 | 2.68 | 3.00 | 3.31 | 3.63 | 3.95 | 4.27 |
| | 1991-1993 | 2.01 | 2.30 | 2.60 | 2.90 | 3.19 | 3.49 | 3.79 | 4.09 |
| | 1994-1996 | 1.97 | 2.26 | 2.56 | 2.86 | 3.15 | 3.45 | 3.75 | 4.05 |
| | 1997+ | 1.94 | 2.23 | 2.53 | 2.83 | 3.12 | 3.42 | 3.72 | 4.02 |
| CO | Pre-1963 | 360.04 | 369.66 | 379.28 | 388.90 | 398.52 | 408.14 | 417.76 | 427.38 |
| | 1963-1969 | 373.12 | 383.10 | 393.08 | 403.06 | 413.04 | 423.02 | 433.00 | 442.98 |
| | 1970-1973 | 282.36 | 295.72 | 309.08 | 322.44 | 335.80 | 349.16 | 362.52 | 375.88 |
| | 1974-1977 | 253.67 | 265.15 | 276.63 | 288.11 | 299.59 | 311.07 | 322.55 | 334.03 |
| | 1978 | 223.94 | 234.08 | 244.22 | 254.36 | 264.50 | 274.64 | 284.78 | 294.92 |
| | 1979-1980 | 187.87 | 197.53 | 207.19 | 216.85 | 226.51 | 236.17 | 245.83 | 255.49 |
| | 1981-1982 | 175.19 | 184.19 | 193.19 | 202.19 | 211.19 | 220.19 | 229.19 | 238.19 |
| | 1983 | 173.09 | 181.99 | 190.89 | 199.79 | 208.69 | 217.59 | 226.49 | 235.39 |
| | 1984 | 174.18 | 183.12 | 192.06 | 201.00 | 209.94 | 218.88 | 227.82 | 236.76 |
| | 1985 | 68.67 | 70.51 | 72.35 | 74.19 | 76.03 | 77.87 | 79.71 | 81.55 |
| | 1986 | 54.59 | 56.45 | 58.31 | 60.17 | 62.03 | 63.89 | 65.75 | 67.61 |
| | 1987-1990 | 38.40 | 40.97 | 43.55 | 46.13 | 48.71 | 51.29 | 53.87 | 56.45 |
| | 1991-1993 | 37.67 | 40.22 | 42.78 | 45.34 | 47.90 | 50.46 | 53.02 | 55.58 |
| | 1994-1996 | 36.76 | 39.27 | 41.79 | 44.31 | 46.83 | 49.35 | 51.87 | 54.39 |
| | 1997+ | 36.13 | 38.62 | 41.12 | 43.62 | 46.12 | 48.62 | 51.12 | 53.62 |
| NOx | Pre-1963 | 5.24 | 5.24 | 5.24 | 5.24 | 5.24 | 5.24 | 5.24 | 5.24 |
| | 1963-1969 | 5.43 | 5.43 | 5.43 | 5.43 | 5.43 | 5.43 | 5.43 | 5.43 |
| | 1970-1973 | 6.23 | 6.23 | 6.23 | 6.23 | 6.23 | 6.23 | 6.23 | 6.23 |
| | 1974-1977 | 4.08 | 4.22 | 4.36 | 4.50 | 4.64 | 4.78 | 4.92 | 5.06 |
| | 1978 | 3.60 | 3.72 | 3.84 | 3.96 | 4.08 | 4.20 | 4.32 | 4.44 |
| | 1979-1980 | 3.43 | 3.55 | 3.67 | 3.79 | 3.91 | 4.03 | 4.15 | 4.27 |
| | 1981-1982 | 3.20 | 3.32 | 3.44 | 3.56 | 3.68 | 3.80 | 3.92 | 4.04 |
| | 1983 | 3.16 | 3.28 | 3.40 | 3.52 | 3.64 | 3.76 | 3.88 | 4.00 |
| | 1984 | 3.18 | 3.30 | 3.42 | 3.54 | 3.66 | 3.78 | 3.90 | 4.02 |
| | 1985 | 3.19 | 3.25 | 3.31 | 3.37 | 3.43 | 3.49 | 3.55 | 3.61 |
| | 1986 | 3.21 | 3.27 | 3.33 | 3.39 | 3.45 | 3.51 | 3.57 | 3.63 |
| | 1987-1990 | 3.81 | 4.15 | 4.50 | 4.84 | 5.19 | 5.53 | 5.88 | 6.22 |
| | 1991-1993 | 3.73 | 4.05 | 4.38 | 4.70 | 5.03 | 5.35 | 5.68 | 6.00 |
| | 1994-1996 | 3.63 | 3.95 | 4.28 | 4.60 | 4.93 | 5.25 | 5.58 | 5.90 |
| | 1997+ | 3.57 | 3.89 | 4.22 | 4.54 | 4.87 | 5.19 | 5.52 | 5.84 |

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# TABLE 2.4.1C

## CRANKCASE AND EVAPORATIVE HYDROCARBON EMISSIONS FOR HIGH ALTITUDE HEAVY DUTY GASOLINE POWERED VEHICLES (RATES REFLECT ZERO TAMPERING)

** CCEV = (HSK * TPD + DNL)/MPD + CC

| Model Years | SHED Hot Soak Emissions (Gm/Trip) | Trips* Per Day | SHED Diurnal Emissions (Gm/Day) | Miles* Per Day | Crankcase Emissions (Gm/Mile) | Total Crankcase and Evap. Emissions (Gm/Mile) |
|---|---|---|---|---|---|---|
| Pre-1968 | 35.96 | 6.88 | 101.26 | 36.70 | 7.35 | 16.85 |
| 1968-1984 | 35.96 | 6.88 | 101.26 | 36.70 | 0.0 | 9.50 |
| 1985+ | 8.24 | 6.88 | 19.28 | 36.70 | 0.0 | 2.07 |

* Default information that may be altered by the MOBILE3 user with information about the local area.

** WHERE :

CCEV = Total untampered crankcase & evaporative HC emissions (Gm/Mile)
HSK = Hot soak emissions (Gm/Trip)
TPD = Trips per day
DNL = Diurnal emissions (Gm/Day)
MPD = Miles per day
CC = Crankcase emissions (Gm/Mile)

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## TABLE 2.4.1D

## TOTAL CRANKCASE AND EVAPORATIVE HC EMISSIONS
## FOR HIGH ALTITUDE
## HEAVY DUTY GASOLINE POWERED VEHICLES
## AT VARIOUS MILEAGE INTERVALS
## (RATES INCLUDE TAMPERING)

| Model | Emission Rate (Grams/Mile) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Years | 0K | 20K | 40K | 60K | 80K | 100K | 120K | 140K |
| Pre-1968 | 16.85 | 16.85 | 16.85 | 16.85 | 16.85 | 16.85 | 16.85 | 16.85 |
| 1968-1984 | 9.68 | 9.70 | 9.73 | 9.76 | 9.79 | 9.82 | 9.85 | 9.87 |
| 1985+ | 2.39 | 2.45 | 2.50 | 2.56 | 2.61 | 2.67 | 2.72 | 2.78 |

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## TABLE 2.4.2A

DATE : MAY 25, 1985

### EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
### HEAVY DUTY GASOLINE POWERED VEHICLES
### TOTAL HC (INCLUDES EVAP & CRANKCASE)

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 44.8 | 1962 | 44.8 | 1963 | 46.2 | 1964 | 46.2 | 1965 | 46.2 | 1966 | 46.2 | 1967 | 46.2 | 1968 | 38.9 | 1969 | 38.9 | 1970 | 29.0 | 1971 | 29.0 | 1972 | 29.0 |
| 1962 | 44.7 | 1963 | 46.1 | 1964 | 46.1 | 1965 | 46.1 | 1966 | 46.1 | 1967 | 46.1 | 1968 | 38.8 | 1969 | 38.8 | 1970 | 28.9 | 1971 | 28.9 | 1972 | 28.9 | 1973 | 28.9 |
| 1963 | 46.0 | 1964 | 46.0 | 1965 | 46.0 | 1966 | 46.0 | 1967 | 46.0 | 1968 | 38.6 | 1969 | 38.6 | 1970 | 28.8 | 1971 | 28.8 | 1972 | 28.8 | 1973 | 28.8 | 1974 | 24.9 |
| 1964 | 45.9 | 1965 | 45.9 | 1966 | 45.9 | 1967 | 45.9 | 1968 | 38.5 | 1969 | 38.5 | 1970 | 28.6 | 1971 | 28.6 | 1972 | 28.6 | 1973 | 28.6 | 1974 | 24.8 | 1975 | 24.8 |
| 1965 | 45.7 | 1966 | 45.7 | 1967 | 45.7 | 1968 | 38.4 | 1969 | 38.4 | 1970 | 28.4 | 1971 | 28.4 | 1972 | 28.4 | 1973 | 28.4 | 1974 | 24.7 | 1975 | 24.7 | 1976 | 24.7 |
| 1966 | 45.5 | 1967 | 45.5 | 1968 | 38.2 | 1969 | 38.2 | 1970 | 28.2 | 1971 | 28.2 | 1972 | 28.2 | 1973 | 28.2 | 1974 | 24.6 | 1975 | 24.6 | 1976 | 24.6 | 1977 | 24.6 |
| 1967 | 45.4 | 1968 | 38.0 | 1969 | 38.0 | 1970 | 28.0 | 1971 | 28.0 | 1972 | 28.0 | 1973 | 28.0 | 1974 | 24.5 | 1975 | 24.5 | 1976 | 24.5 | 1977 | 24.5 | 1978 | 22.7 |
| 1968 | 37.8 | 1969 | 37.8 | 1970 | 27.8 | 1971 | 27.8 | 1972 | 27.8 | 1973 | 27.8 | 1974 | 24.3 | 1975 | 24.3 | 1976 | 24.3 | 1977 | 24.3 | 1978 | 22.6 | 1979 | 16.8 |
| 1969 | 37.6 | 1970 | 27.5 | 1971 | 27.5 | 1972 | 27.5 | 1973 | 27.5 | 1974 | 24.2 | 1975 | 24.2 | 1976 | 24.2 | 1977 | 24.2 | 1978 | 22.5 | 1979 | 16.7 | 1980 | 16.7 |
| 1970 | 27.2 | 1971 | 27.2 | 1972 | 27.2 | 1973 | 27.2 | 1974 | 24.0 | 1975 | 24.0 | 1976 | 24.0 | 1977 | 24.0 | 1978 | 22.3 | 1979 | 16.5 | 1980 | 16.5 | 1981 | 16.0 |
| 1971 | 26.9 | 1972 | 26.9 | 1973 | 26.9 | 1974 | 23.8 | 1975 | 23.8 | 1976 | 23.8 | 1977 | 23.8 | 1978 | 22.1 | 1979 | 16.4 | 1980 | 16.4 | 1981 | 15.8 | 1982 | 15.8 |
| 1972 | 26.6 | 1973 | 26.6 | 1974 | 23.6 | 1975 | 23.6 | 1976 | 23.6 | 1977 | 23.6 | 1978 | 22.0 | 1979 | 16.2 | 1980 | 16.2 | 1981 | 15.7 | 1982 | 15.7 | 1983 | 15.6 |
| 1973 | 26.2 | 1974 | 23.4 | 1975 | 23.4 | 1976 | 23.4 | 1977 | 23.4 | 1978 | 21.8 | 1979 | 16.0 | 1980 | 16.0 | 1981 | 15.5 | 1982 | 15.5 | 1983 | 15.4 | 1984 | 15.4 |
| 1974 | 23.1 | 1975 | 23.1 | 1976 | 23.1 | 1977 | 23.1 | 1978 | 21.5 | 1979 | 15.8 | 1980 | 15.8 | 1981 | 15.3 | 1982 | 15.3 | 1983 | 15.2 | 1984 | 15.2 | 1985 | 6.3 |
| 1975 | 22.9 | 1976 | 22.9 | 1977 | 22.9 | 1978 | 21.3 | 1979 | 15.5 | 1980 | 15.5 | 1981 | 15.1 | 1982 | 15.1 | 1983 | 15.0 | 1984 | 15.0 | 1985 | 6.2 | 1986 | 5.8 |
| 1976 | 22.6 | 1977 | 22.6 | 1978 | 21.0 | 1979 | 15.3 | 1980 | 15.3 | 1981 | 14.8 | 1982 | 14.8 | 1983 | 14.8 | 1984 | 14.8 | 1985 | 6.1 | 1986 | 5.7 | 1987 | 4.6 |
| 1977 | 22.2 | 1978 | 20.7 | 1979 | 15.0 | 1980 | 15.0 | 1981 | 14.6 | 1982 | 14.6 | 1983 | 14.5 | 1984 | 14.5 | 1985 | 6.0 | 1986 | 5.6 | 1987 | 4.4 | 1988 | 4.4 |
| 1978 | 20.4 | 1979 | 14.6 | 1980 | 14.6 | 1981 | 14.3 | 1982 | 14.3 | 1983 | 14.2 | 1984 | 14.2 | 1985 | 5.9 | 1986 | 5.5 | 1987 | 4.3 | 1988 | 4.3 | 1989 | 4.3 |
| 1979 | 14.3 | 1980 | 14.3 | 1981 | 14.0 | 1982 | 14.0 | 1983 | 13.9 | 1984 | 13.9 | 1985 | 5.8 | 1986 | 5.4 | 1987 | 4.1 | 1988 | 4.1 | 1989 | 4.1 | 1990 | 4.1 |
| 1980 | 14.1 | 1981 | 13.8 | 1982 | 13.8 | 1983 | 13.7 | 1984 | 13.7 | 1985 | 5.8 | 1986 | 5.4 | 1987 | 4.0 | 1988 | 4.0 | 1989 | 4.0 | 1990 | 4.0 | 1991 | 3.9 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 29.0 | 1974 | 25.1 | 1975 | 25.1 | 1976 | 25.1 | 1977 | 25.1 | 1978 | 23.2 | 1979 | 17.4 | 1980 | 17.4 | 1981 | 16.8 | 1982 | 16.8 | 1983 | 16.7 | 1984 | 16.8 |
| 1974 | 25.0 | 1975 | 25.0 | 1976 | 25.0 | 1977 | 25.0 | 1978 | 23.2 | 1979 | 17.4 | 1980 | 17.4 | 1981 | 16.7 | 1982 | 16.7 | 1983 | 16.7 | 1984 | 16.7 | 1985 | 6.8 |
| 1975 | 24.9 | 1976 | 24.9 | 1977 | 24.9 | 1978 | 23.1 | 1979 | 17.3 | 1980 | 17.3 | 1981 | 16.7 | 1982 | 16.7 | 1983 | 16.6 | 1984 | 16.6 | 1985 | 6.8 | 1986 | 6.4 |
| 1976 | 24.8 | 1977 | 24.8 | 1978 | 23.0 | 1979 | 17.2 | 1980 | 17.2 | 1981 | 16.6 | 1982 | 16.6 | 1983 | 16.5 | 1984 | 16.6 | 1985 | 6.8 | 1986 | 6.3 | 1987 | 5.5 |
| 1977 | 24.7 | 1978 | 22.9 | 1979 | 17.1 | 1980 | 17.1 | 1981 | 16.5 | 1982 | 16.5 | 1983 | 16.5 | 1984 | 16.5 | 1985 | 6.7 | 1986 | 6.3 | 1987 | 5.5 | 1988 | 5.5 |
| 1978 | 22.8 | 1979 | 17.0 | 1980 | 17.0 | 1981 | 16.4 | 1982 | 16.4 | 1983 | 16.4 | 1984 | 16.4 | 1985 | 6.7 | 1986 | 6.3 | 1987 | 5.4 | 1988 | 5.4 | 1989 | 5.4 |
| 1979 | 16.9 | 1980 | 16.9 | 1981 | 16.3 | 1982 | 16.3 | 1983 | 16.3 | 1984 | 16.3 | 1985 | 6.7 | 1986 | 6.3 | 1987 | 5.4 | 1988 | 5.4 | 1989 | 5.4 | 1990 | 5.4 |
| 1980 | 16.8 | 1981 | 16.2 | 1982 | 16.2 | 1983 | 16.2 | 1984 | 16.2 | 1985 | 6.6 | 1986 | 6.2 | 1987 | 5.3 | 1988 | 5.3 | 1989 | 5.3 | 1990 | 5.3 | 1991 | 5.1 |
| 1981 | 16.1 | 1982 | 16.1 | 1983 | 16.1 | 1984 | 16.1 | 1985 | 6.6 | 1986 | 6.2 | 1987 | 5.2 | 1988 | 5.2 | 1989 | 5.2 | 1990 | 5.2 | 1991 | 5.0 | 1992 | 5.0 |
| 1982 | 16.0 | 1983 | 15.9 | 1984 | 15.9 | 1985 | 6.5 | 1986 | 6.1 | 1987 | 5.2 | 1988 | 5.2 | 1989 | 5.2 | 1990 | 5.2 | 1991 | 5.0 | 1992 | 5.0 | 1993 | 5.0 |
| 1983 | 15.8 | 1984 | 15.8 | 1985 | 6.5 | 1986 | 6.1 | 1987 | 5.1 | 1988 | 5.1 | 1989 | 5.1 | 1990 | 5.1 | 1991 | 4.9 | 1992 | 4.9 | 1993 | 4.9 | 1994 | 4.9 |
| 1984 | 15.6 | 1985 | 6.4 | 1986 | 6.0 | 1987 | 5.0 | 1988 | 5.0 | 1989 | 5.0 | 1990 | 5.0 | 1991 | 4.8 | 1992 | 4.8 | 1993 | 4.8 | 1994 | 4.8 | 1995 | 4.8 |
| 1985 | 6.4 | 1986 | 6.0 | 1987 | 4.9 | 1988 | 4.9 | 1989 | 4.9 | 1990 | 4.9 | 1991 | 4.7 | 1992 | 4.7 | 1993 | 4.7 | 1994 | 4.7 | 1995 | 4.7 | 1996 | 4.7 |
| 1986 | 5.9 | 1987 | 4.8 | 1988 | 4.8 | 1989 | 4.8 | 1990 | 4.8 | 1991 | 4.7 | 1992 | 4.7 | 1993 | 4.7 | 1994 | 4.6 | 1995 | 4.6 | 1996 | 4.6 | 1997 | 4.6 |
| 1987 | 4.7 | 1988 | 4.7 | 1989 | 4.7 | 1990 | 4.7 | 1991 | 4.6 | 1992 | 4.6 | 1993 | 4.6 | 1994 | 4.5 | 1995 | 4.5 | 1996 | 4.5 | 1997 | 4.5 | 1998 | 4.5 |
| 1988 | 4.6 | 1989 | 4.6 | 1990 | 4.6 | 1991 | 4.4 | 1992 | 4.4 | 1993 | 4.4 | 1994 | 4.4 | 1995 | 4.4 | 1996 | 4.4 | 1997 | 4.3 | 1998 | 4.3 | 1999 | 4.3 |
| 1989 | 4.4 | 1990 | 4.4 | 1991 | 4.3 | 1992 | 4.3 | 1993 | 4.3 | 1994 | 4.3 | 1995 | 4.3 | 1996 | 4.3 | 1997 | 4.2 | 1998 | 4.2 | 1999 | 4.2 | 2000 | 4.2 |
| 1990 | 4.3 | 1991 | 4.2 | 1992 | 4.2 | 1993 | 4.2 | 1994 | 4.1 | 1995 | 4.1 | 1996 | 4.1 | 1997 | 4.1 | 1998 | 4.1 | 1999 | 4.1 | 2000 | 4.1 | 2001 | 4.1 |
| 1991 | 4.0 | 1992 | 4.0 | 1993 | 4.0 | 1994 | 4.0 | 1995 | 4.0 | 1996 | 4.0 | 1997 | 3.9 | 1998 | 3.9 | 1999 | 3.9 | 2000 | 3.9 | 2001 | 3.9 | 2002 | 3.9 |
| 1992 | 3.9 | 1993 | 3.9 | 1994 | 3.9 | 1995 | 3.9 | 1996 | 3.9 | 1997 | 3.8 | 1998 | 3.8 | 1999 | 3.8 | 2000 | 3.8 | 2001 | 3.8 | 2002 | 3.8 | 2003 | 3.8 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F. Emissions are based on the January 1 mileage accumulation figures given in Table 2.4.4.

TABLE 2.4.2B

DATE : MAY 25, 1985

## EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
## HEAVY DUTY GASOLINE POWERED VEHICLES
## CO

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 445.3 | 1962 | 445.3 | 1963 | 461.6 | 1964 | 461.6 | 1965 | 461.6 | 1966 | 461.6 | 1967 | 461.6 | 1968 | 461.6 | 1969 | 461.6 | 1970 | 400.8 | 1971 | 400.8 | 1972 | 400.8 |
| 1962 | 443.7 | 1963 | 459.9 | 1964 | 459.9 | 1965 | 459.9 | 1966 | 459.9 | 1967 | 459.9 | 1968 | 459.9 | 1969 | 459.9 | 1970 | 398.5 | 1971 | 398.5 | 1972 | 398.5 | 1973 | 398.5 |
| 1963 | 457.9 | 1964 | 457.9 | 1965 | 457.9 | 1966 | 457.9 | 1967 | 457.9 | 1968 | 457.9 | 1969 | 457.9 | 1970 | 395.9 | 1971 | 395.9 | 1972 | 395.9 | 1973 | 395.9 | 1974 | 351.2 |
| 1964 | 455.8 | 1965 | 455.8 | 1966 | 455.8 | 1967 | 455.8 | 1968 | 455.8 | 1969 | 455.8 | 1970 | 393.0 | 1971 | 393.0 | 1972 | 393.0 | 1973 | 393.0 | 1974 | 348.8 | 1975 | 348.8 |
| 1965 | 453.4 | 1966 | 453.4 | 1967 | 453.4 | 1968 | 453.4 | 1969 | 453.4 | 1970 | 389.9 | 1971 | 389.9 | 1972 | 389.9 | 1973 | 389.9 | 1974 | 346.1 | 1975 | 346.1 | 1976 | 346.1 |
| 1966 | 450.8 | 1967 | 450.8 | 1968 | 450.8 | 1969 | 450.8 | 1970 | 386.4 | 1971 | 386.4 | 1972 | 386.4 | 1973 | 386.4 | 1974 | 343.1 | 1975 | 343.1 | 1976 | 343.1 | 1977 | 343.1 |
| 1967 | 448.0 | 1968 | 448.0 | 1969 | 448.0 | 1970 | 382.5 | 1971 | 382.5 | 1972 | 382.5 | 1973 | 382.5 | 1974 | 339.8 | 1975 | 339.8 | 1976 | 339.8 | 1977 | 339.8 | 1978 | 300.0 |
| 1968 | 444.8 | 1969 | 444.8 | 1970 | 378.3 | 1971 | 378.3 | 1972 | 378.3 | 1973 | 378.3 | 1974 | 336.1 | 1975 | 336.1 | 1976 | 336.1 | 1977 | 336.1 | 1978 | 296.8 | 1979 | 257.2 |
| 1969 | 441.3 | 1970 | 373.6 | 1971 | 373.6 | 1972 | 373.6 | 1973 | 373.6 | 1974 | 332.1 | 1975 | 332.1 | 1976 | 332.1 | 1977 | 332.1 | 1978 | 293.2 | 1979 | 253.8 | 1980 | 253.8 |
| 1970 | 368.4 | 1971 | 368.4 | 1972 | 368.4 | 1973 | 368.4 | 1974 | 327.6 | 1975 | 327.6 | 1976 | 327.6 | 1977 | 327.6 | 1978 | 289.2 | 1979 | 250.1 | 1980 | 250.1 | 1981 | 233.2 |
| 1971 | 362.7 | 1972 | 362.7 | 1973 | 362.7 | 1974 | 322.7 | 1975 | 322.7 | 1976 | 322.7 | 1977 | 322.7 | 1978 | 284.9 | 1979 | 245.9 | 1980 | 245.9 | 1981 | 229.3 | 1982 | 229.3 |
| 1972 | 356.3 | 1973 | 356.3 | 1974 | 317.2 | 1975 | 317.2 | 1976 | 317.2 | 1977 | 317.2 | 1978 | 280.1 | 1979 | 241.4 | 1980 | 241.4 | 1981 | 225.0 | 1982 | 225.0 | 1983 | 222.4 |
| 1973 | 349.3 | 1974 | 311.2 | 1975 | 311.2 | 1976 | 311.2 | 1977 | 311.2 | 1978 | 274.8 | 1979 | 236.3 | 1980 | 236.3 | 1981 | 220.3 | 1982 | 220.3 | 1983 | 217.7 | 1984 | 219.0 |
| 1974 | 304.6 | 1975 | 304.6 | 1976 | 304.6 | 1977 | 304.6 | 1978 | 268.9 | 1979 | 230.7 | 1980 | 230.7 | 1981 | 215.1 | 1982 | 215.1 | 1983 | 212.6 | 1984 | 213.8 | 1985 | 76.8 |
| 1975 | 297.3 | 1976 | 297.3 | 1977 | 297.3 | 1978 | 262.4 | 1979 | 224.5 | 1980 | 224.5 | 1981 | 209.4 | 1982 | 209.4 | 1983 | 206.9 | 1984 | 208.1 | 1985 | 75.7 | 1986 | 61.7 |
| 1976 | 289.2 | 1977 | 289.2 | 1978 | 255.3 | 1979 | 217.7 | 1980 | 217.7 | 1981 | 203.0 | 1982 | 203.0 | 1983 | 200.6 | 1984 | 201.8 | 1985 | 74.4 | 1986 | 60.3 | 1987 | 38.0 |
| 1977 | 280.2 | 1978 | 247.4 | 1979 | 210.2 | 1980 | 210.2 | 1981 | 196.0 | 1982 | 196.0 | 1983 | 193.7 | 1984 | 194.8 | 1985 | 72.9 | 1986 | 58.9 | 1987 | 37.1 | 1988 | 37.1 |
| 1978 | 238.6 | 1979 | 201.9 | 1980 | 201.9 | 1981 | 188.2 | 1982 | 188.2 | 1983 | 186.0 | 1984 | 187.1 | 1985 | 71.3 | 1986 | 57.3 | 1987 | 36.1 | 1988 | 36.1 | 1989 | 36.1 |
| 1979 | 192.7 | 1980 | 192.7 | 1981 | 179.7 | 1982 | 179.7 | 1983 | 177.5 | 1984 | 178.6 | 1985 | 69.6 | 1986 | 55.5 | 1987 | 35.0 | 1988 | 35.0 | 1989 | 35.0 | 1990 | 35.0 |
| 1980 | 187.9 | 1981 | 175.2 | 1982 | 175.2 | 1983 | 173.1 | 1984 | 174.2 | 1985 | 68.7 | 1986 | 54.6 | 1987 | 34.4 | 1988 | 34.4 | 1989 | 34.4 | 1990 | 34.4 | 1991 | 33.7 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 400.8 | 1974 | 355.5 | 1975 | 355.5 | 1976 | 355.5 | 1977 | 355.5 | 1978 | 313.9 | 1979 | 273.5 | 1980 | 273.5 | 1981 | 255.0 | 1982 | 255.0 | 1983 | 252.0 | 1984 | 253.5 |
| 1974 | 353.5 | 1975 | 353.5 | 1976 | 353.5 | 1977 | 353.5 | 1978 | 312.1 | 1979 | 271.8 | 1980 | 271.8 | 1981 | 253.4 | 1982 | 253.4 | 1983 | 250.5 | 1984 | 251.9 | 1985 | 84.7 |
| 1975 | 351.2 | 1976 | 351.2 | 1977 | 351.2 | 1978 | 310.1 | 1979 | 270.0 | 1980 | 270.0 | 1981 | 251.7 | 1982 | 251.7 | 1983 | 248.7 | 1984 | 250.2 | 1985 | 84.3 | 1986 | 70.4 |
| 1976 | 348.8 | 1977 | 348.8 | 1978 | 307.9 | 1979 | 267.9 | 1980 | 267.9 | 1981 | 249.8 | 1982 | 249.8 | 1983 | 246.8 | 1984 | 248.2 | 1985 | 83.9 | 1986 | 70.0 | 1987 | 44.0 |
| 1977 | 346.1 | 1978 | 305.6 | 1979 | 265.6 | 1980 | 265.6 | 1981 | 247.6 | 1982 | 247.6 | 1983 | 244.7 | 1984 | 246.1 | 1985 | 83.5 | 1986 | 69.6 | 1987 | 43.7 | 1988 | 43.7 |
| 1978 | 302.9 | 1979 | 263.1 | 1980 | 263.1 | 1981 | 245.3 | 1962 | 245.3 | 1983 | 242.4 | 1984 | 243.8 | 1985 | 83.0 | 1986 | 69.1 | 1987 | 43.4 | 1988 | 43.4 | 1989 | 43.4 |
| 1979 | 260.3 | 1980 | 260.3 | 1981 | 242.7 | 1982 | 242.7 | 1983 | 239.8 | 1984 | 241.2 | 1985 | 82.5 | 1986 | 68.5 | 1987 | 43.1 | 1988 | 43.1 | 1989 | 43.1 | 1990 | 43.1 |
| 1980 | 257.2 | 1981 | 239.8 | 1982 | 239.8 | 1983 | 237.0 | 1984 | 238.4 | 1985 | 81.9 | 1986 | 67.9 | 1987 | 42.7 | 1988 | 42.7 | 1989 | 42.7 | 1990 | 42.7 | 1991 | 41.9 |
| 1981 | 236.7 | 1982 | 236.7 | 1983 | 233.9 | 1984 | 235.2 | 1985 | 81.2 | 1986 | 67.3 | 1987 | 42.3 | 1988 | 42.3 | 1989 | 42.3 | 1990 | 42.3 | 1991 | 41.5 | 1992 | 41.5 |
| 1982 | 233.2 | 1983 | 230.4 | 1984 | 231.8 | 1985 | 80.5 | 1986 | 66.6 | 1987 | 41.9 | 1988 | 41.9 | 1989 | 41.9 | 1990 | 41.9 | 1991 | 41.0 | 1992 | 41.0 | 1993 | 41.0 |
| 1983 | 226.6 | 1984 | 227.9 | 1985 | 79.7 | 1986 | 65.8 | 1987 | 41.4 | 1988 | 41.4 | 1989 | 41.4 | 1990 | 41.4 | 1991 | 40.5 | 1992 | 40.5 | 1993 | 40.5 | 1994 | 39.4 |
| 1984 | 223.7 | 1985 | 78.9 | 1986 | 64.9 | 1987 | 40.8 | 1988 | 40.8 | 1989 | 40.8 | 1990 | 40.8 | 1991 | 40.0 | 1992 | 40.0 | 1993 | 40.0 | 1994 | 38.9 | 1995 | 38.9 |
| 1985 | 77.9 | 1986 | 63.9 | 1987 | 40.2 | 1988 | 40.2 | 1989 | 40.2 | 1990 | 40.2 | 1991 | 39.4 | 1992 | 39.4 | 1993 | 39.4 | 1994 | 38.3 | 1995 | 38.3 | 1996 | 38.3 |
| 1986 | 62.8 | 1987 | 39.6 | 1988 | 39.6 | 1989 | 39.6 | 1990 | 39.6 | 1991 | 38.7 | 1992 | 38.7 | 1993 | 38.7 | 1994 | 37.6 | 1995 | 37.6 | 1996 | 37.6 | 1997 | 36.9 |
| 1987 | 38.8 | 1988 | 38.8 | 1989 | 38.8 | 1990 | 38.8 | 1991 | 38.0 | 1992 | 38.0 | 1993 | 38.0 | 1994 | 36.9 | 1995 | 36.9 | 1996 | 36.9 | 1997 | 36.2 | 1998 | 36.2 |
| 1988 | 38.0 | 1989 | 38.0 | 1990 | 38.0 | 1991 | 37.2 | 1992 | 37.2 | 1993 | 37.2 | 1994 | 36.2 | 1995 | 36.2 | 1996 | 36.2 | 1997 | 35.5 | 1998 | 35.5 | 1999 | 35.5 |
| 1989 | 37.1 | 1990 | 37.1 | 1991 | 36.3 | 1992 | 36.3 | 1993 | 36.3 | 1994 | 35.3 | 1995 | 35.3 | 1996 | 35.3 | 1997 | 34.6 | 1998 | 34.6 | 1999 | 34.6 | 2000 | 34.6 |
| 1990 | 36.1 | 1991 | 35.3 | 1992 | 35.3 | 1993 | 35.3 | 1994 | 34.4 | 1995 | 34.4 | 1996 | 34.4 | 1997 | 33.7 | 1998 | 33.7 | 1999 | 33.7 | 2000 | 33.7 | 2001 | 33.7 |
| 1991 | 34.2 | 1992 | 34.2 | 1993 | 34.2 | 1994 | 33.3 | 1995 | 33.3 | 1996 | 33.3 | 1997 | 32.7 | 1998 | 32.7 | 1999 | 32.7 | 2000 | 32.7 | 2001 | 32.7 | 2002 | 32.7 |
| 1992 | 33.7 | 1993 | 33.7 | 1994 | 32.8 | 1995 | 32.8 | 1996 | 32.8 | 1997 | 32.1 | 1998 | 32.1 | 1999 | 32.1 | 2000 | 32.1 | 2001 | 32.1 | 2002 | 32.1 | 2003 | 32.1 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F. Emissions are based on the January 1 mileage accumulation figures given in Table 2.4.4.

TABLE 2.4.2C

DATE : MAY 25, 1985

# EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE HEAVY DUTY GASOLINE POWERED VEHICLES

## NOx

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 5.2 | 1962 | 5.2 | 1963 | 5.4 | 1964 | 5.4 | 1965 | 5.4 | 1966 | 5.4 | 1967 | 5.4 | 1968 | 5.4 | 1969 | 5.4 | 1970 | 6.2 | 1971 | 6.2 | 1972 | 6.2 |
| 1962 | 5.2 | 1963 | 5.4 | 1964 | 5.4 | 1965 | 5.4 | 1966 | 5.4 | 1967 | 5.4 | 1968 | 5.4 | 1969 | 5.4 | 1970 | 6.2 | 1971 | 6.2 | 1972 | 6.2 | 1973 | 6.2 |
| 1963 | 5.4 | 1964 | 5.4 | 1965 | 5.4 | 1966 | 5.4 | 1967 | 5.4 | 1968 | 5.4 | 1969 | 5.4 | 1970 | 6.2 | 1971 | 6.2 | 1972 | 6.2 | 1973 | 6.2 | 1974 | 5.3 |
| 1964 | 5.4 | 1965 | 5.4 | 1966 | 5.4 | 1967 | 5.4 | 1968 | 5.4 | 1969 | 5.4 | 1970 | 6.2 | 1971 | 6.2 | 1972 | 6.2 | 1973 | 6.2 | 1974 | 5.2 | 1975 | 5.2 |
| 1965 | 5.4 | 1966 | 5.4 | 1967 | 5.4 | 1968 | 5.4 | 1969 | 5.4 | 1970 | 6.2 | 1971 | 6.2 | 1972 | 6.2 | 1973 | 6.2 | 1974 | 5.2 | 1975 | 5.2 | 1976 | 5.2 |
| 1966 | 5.4 | 1967 | 5.4 | 1968 | 5.4 | 1969 | 5.4 | 1970 | 6.2 | 1971 | 6.2 | 1972 | 6.2 | 1973 | 6.2 | 1974 | 5.2 | 1975 | 5.2 | 1976 | 5.2 | 1977 | 5.2 |
| 1967 | 5.4 | 1968 | 5.4 | 1969 | 5.4 | 1970 | 6.2 | 1971 | 6.2 | 1972 | 6.2 | 1973 | 6.2 | 1974 | 5.1 | 1975 | 5.1 | 1976 | 5.1 | 1977 | 5.1 | 1978 | 4.5 |
| 1968 | 5.4 | 1969 | 5.4 | 1970 | 6.2 | 1971 | 6.2 | 1972 | 6.2 | 1973 | 6.2 | 1974 | 5.1 | 1975 | 5.1 | 1976 | 5.1 | 1977 | 5.1 | 1978 | 4.5 | 1979 | 4.3 |
| 1969 | 5.4 | 1970 | 6.2 | 1971 | 6.2 | 1972 | 6.2 | 1973 | 6.2 | 1974 | 5.0 | 1975 | 5.0 | 1976 | 5.0 | 1977 | 5.0 | 1978 | 4.4 | 1979 | 4.2 | 1980 | 4.2 |
| 1970 | 6.2 | 1971 | 6.2 | 1972 | 6.2 | 1973 | 6.2 | 1974 | 5.0 | 1975 | 5.0 | 1976 | 5.0 | 1977 | 5.0 | 1978 | 4.4 | 1979 | 4.2 | 1980 | 4.2 | 1981 | 4.0 |
| 1971 | 6.2 | 1972 | 6.2 | 1973 | 6.2 | 1974 | 4.9 | 1975 | 4.9 | 1976 | 4.9 | 1977 | 4.9 | 1978 | 4.3 | 1979 | 4.2 | 1980 | 4.2 | 1981 | 3.9 | 1982 | 3.9 |
| 1972 | 6.2 | 1973 | 6.2 | 1974 | 4.9 | 1975 | 4.9 | 1976 | 4.9 | 1977 | 4.9 | 1978 | 4.3 | 1979 | 4.1 | 1980 | 4.1 | 1981 | 3.9 | 1982 | 3.9 | 1983 | 3.8 |
| 1973 | 6.2 | 1974 | 4.8 | 1975 | 4.8 | 1976 | 4.8 | 1977 | 4.8 | 1978 | 4.2 | 1979 | 4.0 | 1980 | 4.0 | 1981 | 3.8 | 1982 | 3.8 | 1983 | 3.8 | 1984 | 3.8 |
| 1974 | 4.7 | 1975 | 4.7 | 1976 | 4.7 | 1977 | 4.7 | 1978 | 4.1 | 1979 | 4.0 | 1980 | 4.0 | 1981 | 3.7 | 1982 | 3.7 | 1983 | 3.7 | 1984 | 3.7 | 1985 | 3.5 |
| 1975 | 4.6 | 1976 | 4.6 | 1977 | 4.6 | 1978 | 4.1 | 1979 | 3.9 | 1980 | 3.9 | 1981 | 3.7 | 1982 | 3.7 | 1983 | 3.6 | 1984 | 3.6 | 1985 | 3.4 | 1986 | 3.4 |
| 1976 | 4.5 | 1977 | 4.5 | 1978 | 4.0 | 1979 | 3.8 | 1980 | 3.8 | 1981 | 3.6 | 1982 | 3.6 | 1983 | 3.5 | 1984 | 3.6 | 1985 | 3.4 | 1986 | 3.4 | 1987 | 4.3 |
| 1977 | 4.4 | 1978 | 3.9 | 1979 | 3.7 | 1980 | 3.7 | 1981 | 3.5 | 1982 | 3.5 | 1983 | 3.4 | 1984 | 3.5 | 1985 | 3.3 | 1986 | 3.3 | 1987 | 4.1 | 1988 | 4.1 |
| 1978 | 3.8 | 1979 | 3.6 | 1980 | 3.6 | 1981 | 3.4 | 1982 | 3.4 | 1983 | 3.3 | 1984 | 3.4 | 1985 | 3.3 | 1986 | 3.3 | 1987 | 3.9 | 1988 | 3.9 | 1989 | 3.9 |
| 1979 | 3.5 | 1980 | 3.5 | 1981 | 3.3 | 1982 | 3.3 | 1983 | 3.2 | 1984 | 3.2 | 1985 | 3.2 | 1986 | 3.2 | 1987 | 3.7 | 1988 | 3.7 | 1989 | 3.7 | 1990 | 3.7 |
| 1980 | 3.4 | 1981 | 3.2 | 1982 | 3.2 | 1983 | 3.2 | 1984 | 3.2 | 1985 | 3.2 | 1986 | 3.2 | 1987 | 3.6 | 1988 | 3.6 | 1989 | 3.6 | 1990 | 3.6 | 1991 | 3.6 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 6.2 | 1974 | 5.3 | 1975 | 5.3 | 1976 | 5.3 | 1977 | 5.3 | 1978 | 4.7 | 1979 | 4.5 | 1980 | 4.5 | 1981 | 4.3 | 1982 | 4.3 | 1983 | 4.2 | 1984 | 4.2 |
| 1974 | 5.3 | 1975 | 5.3 | 1976 | 5.3 | 1977 | 5.3 | 1978 | 4.6 | 1979 | 4.5 | 1980 | 4.5 | 1981 | 4.2 | 1982 | 4.2 | 1983 | 4.2 | 1984 | 4.2 | 1985 | 3.7 |
| 1975 | 5.3 | 1976 | 5.3 | 1977 | 5.3 | 1978 | 4.6 | 1979 | 4.4 | 1980 | 4.4 | 1981 | 4.2 | 1982 | 4.2 | 1983 | 4.2 | 1984 | 4.2 | 1985 | 3.7 | 1986 | 3.7 |
| 1976 | 5.2 | 1977 | 5.2 | 1978 | 4.6 | 1979 | 4.4 | 1980 | 4.4 | 1981 | 4.2 | 1982 | 4.2 | 1983 | 4.2 | 1984 | 4.2 | 1985 | 3.7 | 1986 | 3.7 | 1987 | 5.3 |
| 1977 | 5.2 | 1978 | 4.6 | 1979 | 4.4 | 1980 | 4.4 | 1981 | 4.2 | 1982 | 4.2 | 1983 | 4.1 | 1984 | 4.1 | 1985 | 3.7 | 1986 | 3.7 | 1987 | 5.2 | 1988 | 5.2 |
| 1978 | 4.5 | 1979 | 4.4 | 1980 | 4.4 | 1981 | 4.1 | 1982 | 4.1 | 1983 | 4.1 | 1984 | 4.1 | 1985 | 3.7 | 1986 | 3.7 | 1987 | 5.2 | 1988 | 5.2 | 1989 | 5.2 |
| 1979 | 4.3 | 1980 | 4.3 | 1981 | 4.1 | 1982 | 4.1 | 1983 | 4.1 | 1984 | 4.1 | 1985 | 3.6 | 1986 | 3.7 | 1987 | 5.1 | 1988 | 5.1 | 1989 | 5.1 | 1990 | 5.1 |
| 1980 | 4.3 | 1981 | 4.1 | 1982 | 4.1 | 1983 | 4.0 | 1984 | 4.0 | 1985 | 3.6 | 1986 | 3.6 | 1987 | 5.1 | 1988 | 5.1 | 1989 | 5.1 | 1990 | 5.1 | 1991 | 4.9 |
| 1981 | 4.0 | 1982 | 4.0 | 1983 | 4.0 | 1984 | 4.0 | 1985 | 3.6 | 1986 | 3.6 | 1987 | 5.0 | 1988 | 5.0 | 1989 | 5.0 | 1990 | 5.0 | 1991 | 4.8 | 1992 | 4.8 |
| 1982 | 4.0 | 1983 | 3.9 | 1984 | 4.0 | 1985 | 3.6 | 1986 | 3.6 | 1987 | 4.9 | 1988 | 4.9 | 1989 | 4.9 | 1990 | 4.9 | 1991 | 4.7 | 1992 | 4.7 | 1993 | 4.7 |
| 1983 | 3.9 | 1984 | 3.9 | 1985 | 3.6 | 1986 | 3.6 | 1987 | 4.8 | 1988 | 4.8 | 1989 | 4.8 | 1990 | 4.8 | 1991 | 4.6 | 1992 | 4.6 | 1993 | 4.6 | 1994 | 4.5 |
| 1984 | 3.8 | 1985 | 3.5 | 1986 | 3.5 | 1987 | 4.7 | 1988 | 4.7 | 1989 | 4.7 | 1990 | 4.7 | 1991 | 4.6 | 1992 | 4.6 | 1993 | 4.6 | 1994 | 4.5 | 1995 | 4.5 |
| 1985 | 3.5 | 1986 | 3.5 | 1987 | 4.6 | 1988 | 4.6 | 1989 | 4.6 | 1990 | 4.6 | 1991 | 4.5 | 1992 | 4.5 | 1993 | 4.5 | 1994 | 4.4 | 1995 | 4.4 | 1996 | 4.4 |
| 1986 | 3.5 | 1987 | 4.5 | 1988 | 4.5 | 1989 | 4.5 | 1990 | 4.5 | 1991 | 4.4 | 1992 | 4.4 | 1993 | 4.4 | 1994 | 4.3 | 1995 | 4.3 | 1996 | 4.3 | 1997 | 4.2 |
| 1987 | 4.4 | 1988 | 4.4 | 1989 | 4.4 | 1990 | 4.4 | 1991 | 4.2 | 1992 | 4.2 | 1993 | 4.2 | 1994 | 4.1 | 1995 | 4.1 | 1996 | 4.1 | 1997 | 4.1 | 1998 | 4.1 |
| 1988 | 4.3 | 1989 | 4.3 | 1990 | 4.3 | 1991 | 4.1 | 1992 | 4.1 | 1993 | 4.1 | 1994 | 4.0 | 1995 | 4.0 | 1996 | 4.0 | 1997 | 4.0 | 1998 | 4.0 | 1999 | 4.0 |
| 1989 | 4.1 | 1990 | 4.1 | 1991 | 4.0 | 1992 | 4.0 | 1993 | 4.0 | 1994 | 3.9 | 1995 | 3.9 | 1996 | 3.9 | 1997 | 3.8 | 1998 | 3.8 | 1999 | 3.8 | 2000 | 3.8 |
| 1990 | 3.9 | 1991 | 3.8 | 1992 | 3.8 | 1993 | 3.8 | 1994 | 3.7 | 1995 | 3.7 | 1996 | 3.7 | 1997 | 3.7 | 1998 | 3.7 | 1999 | 3.7 | 2000 | 3.7 | 2001 | 3.7 |
| 1991 | 3.6 | 1992 | 3.6 | 1993 | 3.6 | 1994 | 3.5 | 1995 | 3.5 | 1996 | 3.5 | 1997 | 3.5 | 1998 | 3.5 | 1999 | 3.5 | 2000 | 3.5 | 2001 | 3.5 | 2002 | 3.5 |
| 1992 | 3.6 | 1993 | 3.6 | 1994 | 3.5 | 1995 | 3.5 | 1996 | 3.5 | 1997 | 3.4 | 1998 | 3.4 | 1999 | 3.4 | 2000 | 3.4 | 2001 | 3.4 | 2002 | 3.4 | 2003 | 3.4 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F. Emissions are based on the January 1 mileage accumulation figures given in Table 2.4.4.

### TABLE 2.4.3

### IDLE EMISSION RATES FOR HIGH ALTITUDE HEAVY DUTY GASOLINE POWERED VEHICLES

* IER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Min.) | Deterioration Rate (Gm/Min/10K Mi) |
|---|---|---|---|
| HC | Pre-1963 | 2.83 | 0.04 |
| | 1963-1969 | 2.83 | 0.04 |
| | 1970-1973 | 0.87 | 0.04 |
| | 1974-1977 | 0.87 | 0.02 |
| | 1978 | 0.87 | 0.02 |
| | 1979-1980 | 0.44 | 0.01 |
| | 1981-1982 | 0.44 | 0.01 |
| | 1983 | 0.44 | 0.01 |
| | 1984 | 0.23 | 0.03 |
| | 1985 | 0.12 | 0.04 |
| | 1986 | 0.12 | 0.04 |
| | 1987-1990 | 0.12 | 0.04 |
| | 1991-1993 | 0.12 | 0.04 |
| | 1994-1996 | 0.12 | 0.04 |
| | 1997+ | 0.12 | 0.04 |
| CO | Pre-1963 | 25.75 | 0.53 |
| | 1963-1969 | 25.75 | 0.53 |
| | 1970-1973 | 6.80 | 0.28 |
| | 1974-1977 | 6.80 | 0.27 |
| | 1978 | 6.80 | 0.27 |
| | 1979-1980 | 7.09 | 0.28 |
| | 1981-1982 | 7.09 | 0.28 |
| | 1983 | 7.09 | 0.28 |
| | 1984 | 1.21 | 0.14 |
| | 1985 | 0.49 | 0.28 |
| | 1986 | 0.49 | 0.28 |
| | 1987-1990 | 0.49 | 0.28 |
| | 1991-1993 | 0.49 | 0.28 |
| | 1994-1996 | 0.49 | 0.28 |
| | 1997+ | 0.49 | 0.28 |
| NOx | Pre-1963 | 0.05 | 0.0 |
| | 1963-1969 | 0.05 | 0.0 |
| | 1970-1973 | 0.03 | 0.0 |
| | 1974-1977 | 0.03 | 0.0 |
| | 1978 | 0.03 | 0.0 |
| | 1979-1980 | 0.03 | 0.0 |
| | 1981-1982 | 0.03 | 0.0 |
| | 1983 | 0.03 | 0.0 |
| | 1984 | 0.07 | 0.0 |
| | 1985 | 0.01 | 0.0 |
| | 1986 | 0.01 | 0.0 |
| | 1987-1990 | 0.01 | 0.0 |
| | 1991-1993 | 0.01 | 0.0 |
| | 1994-1996 | 0.01 | 0.0 |
| | 1997+ | 0.01 | 0.0 |

* WHERE :
IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

DATE : MAY 25, 1985

## TABLE 2.4.4

## REGISTRATION MIX AND MILEAGE ACCUMULATION RATES FOR HIGH ALTITUDE HEAVY DUTY GASOLINE POWERED VEHICLES

| Model Year Index** | July 1 Registration Mix* | Mileage Accumulation Rate per vehicle* | Jan 1 Registration Mix | Jan 1 Mileage Accumulation Rate (fleet) | Jan 1 Mileage Accumulation (fleet) |
|---|---|---|---|---|---|
| 1 | 0.079 | 19967. | 0.0 | 0. | 0. |
| 2 | 0.136 | 18077. | 0.136 | 19967. | 9983. |
| 3 | 0.116 | 16365. | 0.116 | 18077. | 29005. |
| 4 | 0.099 | 14815. | 0.099 | 16365. | 46226. |
| 5 | 0.085 | 13413. | 0.085 | 14815. | 61816. |
| 6 | 0.072 | 12143. | 0.072 | 13413. | 75930. |
| 7 | 0.062 | 10993. | 0.062 | 12143. | 88708. |
| 8 | 0.053 | 9952. | 0.053 | 10993. | 100276. |
| 9 | 0.045 | 9010. | 0.045 | 9952. | 110749. |
| 10 | 0.038 | 8156. | 0.038 | 9010. | 120230. |
| 11 | 0.033 | 7384. | 0.033 | 8156. | 128813. |
| 12 | 0.028 | 6685. | 0.028 | 7384. | 136583. |
| 13 | 0.024 | 6052. | 0.024 | 6685. | 143617. |
| 14 | 0.020 | 5479. | 0.020 | 6052. | 149985. |
| 15 | 0.018 | 4960. | 0.018 | 5479. | 155751. |
| 16 | 0.015 | 4490. | 0.015 | 4960. | 160970. |
| 17 | 0.013 | 4065. | 0.013 | 4490. | 165695. |
| 18 | 0.011 | 3680. | 0.011 | 4065. | 169973. |
| 19 | 0.009 | 3332. | 0.009 | 3680. | 173845. |
| 20+ | 0.045 | 3016. | 0.045 | 3332. | 177351. |

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

DATE : MAY 25, 1985

## TABLE 2.4.5

## EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR HIGH ALTITUDE HEAVY DUTY GASOLINE POWERED VEHICLES JANUARY 1, 1988

| Model Years | (A) HDGV Fleet Registration | (B) Sales Fraction | (A*B) | (C=A*B/DAF) HDGV Registration | (D) Annual Mileage Accrual Rate | (C*D) | (C*D/TFNORM) Travel Fractions |
|---|---|---|---|---|---|---|---|
| 1988 | 0.0 | 1.000 | 0.0 | 0.0 | 0. | 0.0 | 0.0 |
| 1987 | 0.136 | 1.000 | 0.136 | 0.148 | 19967. | 2945.2 | 0.226 |
| 1986 | 0.116 | 1.000 | 0.116 | 0.126 | 18077. | 2274.3 | 0.175 |
| 1985 | 0.099 | 1.000 | 0.099 | 0.107 | 16365. | 1757.2 | 0.135 |
| 1984 | 0.085 | 1.000 | 0.085 | 0.092 | 14815. | 1365.8 | 0.105 |
| 1983 | 0.072 | 1.000 | 0.072 | 0.078 | 13413. | 1047.4 | 0.080 |
| 1982 | 0.062 | 1.000 | 0.062 | 0.067 | 12143. | 816.6 | 0.063 |
| 1981 | 0.053 | 1.000 | 0.053 | 0.057 | 10993. | 631.9 | 0.049 |
| 1980 | 0.045 | 1.000 | 0.045 | 0.049 | 9952. | 485.7 | 0.037 |
| 1979 | 0.038 | 1.000 | 0.038 | 0.041 | 9010. | 371.3 | 0.029 |
| 1978 | 0.033 | 1.000 | 0.033 | 0.036 | 8156. | 291.9 | 0.022 |
| 1977 | 0.028 | 1.000 | 0.028 | 0.030 | 7384. | 224.2 | 0.017 |
| 1976 | 0.024 | 1.000 | 0.024 | 0.026 | 6685. | 174.0 | 0.013 |
| 1975 | 0.020 | 1.000 | 0.020 | 0.022 | 6052. | 131.3 | 0.010 |
| 1974 | 0.018 | 1.000 | 0.018 | 0.020 | 5479. | 107.0 | 0.008 |
| 1973 | 0.015 | 1.000 | 0.015 | 0.016 | 4960. | 80.7 | 0.006 |
| 1972 | 0.013 | 1.000 | 0.013 | 0.014 | 4490. | 63.3 | 0.005 |
| 1971 | 0.011 | 1.000 | 0.011 | 0.012 | 4065. | 48.5 | 0.004 |
| 1970 | 0.009 | 1.000 | 0.009 | 0.010 | 3680. | 35.9 | 0.003 |
| 1969- | 0.045 | 1.000 | 0.045 | 0.049 | 3332. | 162.6 | 0.012 |
|  |  | DAF: | 0.921 |  | TFNORM: | 13015.0 |  |

WHERE :

A = January 1 registration mix from Table 2.4.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 2.4.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI) = .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

DATE : MAY 25, 1985

## TABLE 2.4.6

## SPEED CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE HEAVY DUTY GASOLINE POWERED VEHICLES

$$* \; SCF(s) = EXP(A + B*s + C*s^2) \; , \; HC \; \& \; CO$$
$$= A + B*s + C*s^2 \; , \; NOx$$

| Pol | Model Years | Coefficients A | B | C |
|---|---|---|---|---|
| HC | All | 1.60800 | -0.09700 | 0.00083 |
| CO | All | 1.52000 | -0.09800 | 0.00110 |
| NOx | All | 0.82400 | 0.00880 | 0.0 |

* WHERE: s = average speed (mph)

DATE : MAY 25, 1985

## TABLE 2.4.7

## TEMPERATURE CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE HEAVY DUTY GASOLINE POWERED VEHICLES

* TCF = EXP( TC * (T - 75.0))

| Pol | Model Years | TC Low | TC High |
|---|---|---|---|
| HC | Pre-1970 | -0.58903E-02 | 0.13458E-02 |
| | 1970-1973 | -0.73870E-02 | 0.52317E-02 |
| | 1974-1978 | -0.49759E-02 | 0.54651E-02 |
| | 1979-1983 | -0.28549E-02 | 0.10082E-01 |
| | 1984 | -0.74107E-02 | 0.20546E-01 |
| | 1985+ | -0.92859E-02 | 0.84842E-02 |
| CO | Pre-1970 | -0.20576E-02 | 0.81720E-02 |
| | 1970-1973 | -0.45541E-02 | 0.20268E-01 |
| | 1974-1978 | -0.42899E-02 | 0.24127E-01 |
| | 1979-1983 | -0.13085E-02 | 0.22061E-01 |
| | 1984 | -0.77117E-02 | 0.27019E-01 |
| | 1985+ | -0.60195E-02 | 0.71457E-02 |
| NOx | Pre-1970 | -0.64315E-02 | -0.83986E-02 |
| | 1970-1973 | -0.55456E-02 | -0.86880E-02 |
| | 1974-1978 | -0.13969E-02 | -0.18079E-01 |
| | 1979-1983 | -0.46352E-03 | -0.74889E-02 |
| | 1984 | -0.57524E-02 | -0.21593E-01 |
| | 1985+ | -0.19733E-02 | -0.29584E-01 |

* WHERE :

TCF = Temperature correction factor for appropriate pollutant, ambient temperature, and model year
T = Ambient temperature (Fahrenheit)
TC = Temperature correction factor coefficient for appropriate pollutant, reference temperature, and model year
75.0 = Reference temperature

DATE : MAY 25, 1985

TABLE 2.5.1

# EXHAUST EMISSION RATES FOR HIGH ALTITUDE LIGHT DUTY DIESEL POWERED VEHICLES (RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Mile) | Deterioration Rate (Gm/Mi/10K Mi) | 50,000 Mile Emission Level (Grams/Mile) |
|---|---|---|---|---|
| HC | Pre-1975 | 3.01 | 0.08 | 3.41 |
| | 1975-1976 | 0.97 | 0.07 | 1.32 |
| | 1977 | 0.97 | 0.07 | 1.32 |
| | 1978 | 0.97 | 0.07 | 1.32 |
| | 1979 | 0.97 | 0.07 | 1.32 |
| | 1980-1981 | 0.67 | 0.03 | 0.82 |
| | 1982-1983 | 0.40 | 0.03 | 0.55 |
| | 1984+ | 0.29 | 0.03 | 0.44 |
| CO | Pre-1975 | 4.74 | 0.13 | 5.39 |
| | 1975-1976 | 2.05 | 0.09 | 2.50 |
| | 1977 | 2.05 | 0.09 | 2.50 |
| | 1978 | 2.05 | 0.09 | 2.50 |
| | 1979 | 2.05 | 0.09 | 2.50 |
| | 1980-1981 | 2.01 | 0.04 | 2.21 |
| | 1982-1983 | 2.01 | 0.04 | 2.21 |
| | 1984+ | 1.15 | 0.04 | 1.35 |
| NOx | Pre-1975 | 1.46 | 0.04 | 1.66 |
| | 1975-1976 | 1.40 | 0.04 | 1.60 |
| | 1977 | 1.40 | 0.04 | 1.60 |
| | 1978 | 1.40 | 0.04 | 1.60 |
| | 1979 | 1.40 | 0.04 | 1.60 |
| | 1980 | 1.40 | 0.04 | 1.60 |
| | 1981-1984 | 1.31 | 0.03 | 1.46 |
| | 1985+ | 0.87 | 0.03 | 1.02 |

* WHERE :
BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

DATE : MAY 25, 1985

TABLE 2.5.2A

DATE : MAY 25, 1985

## EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
## LIGHT DUTY DIESEL POWERED VEHICLES
## TOTAL HC

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 4.2 | 1962 | 4.2 | 1963 | 4.2 | 1964 | 4.2 | 1965 | 4.2 | 1966 | 4.2 | 1967 | 4.2 | 1968 | 4.2 | 1969 | 4.2 | 1970 | 4.2 | 1971 | 4.2 | 1972 | 4.2 |
| 1962 | 4.2 | 1963 | 4.2 | 1964 | 4.2 | 1965 | 4.2 | 1966 | 4.2 | 1967 | 4.2 | 1968 | 4.2 | 1969 | 4.2 | 1970 | 4.2 | 1971 | 4.2 | 1972 | 4.2 | 1973 | 4.2 |
| 1963 | 4.2 | 1964 | 4.2 | 1965 | 4.2 | 1966 | 4.2 | 1967 | 4.2 | 1968 | 4.2 | 1969 | 4.2 | 1970 | 4.2 | 1971 | 4.2 | 1972 | 4.2 | 1973 | 4.2 | 1974 | 4.2 |
| 1964 | 4.1 | 1965 | 4.1 | 1966 | 4.1 | 1967 | 4.1 | 1968 | 4.1 | 1969 | 4.1 | 1970 | 4.1 | 1971 | 4.1 | 1972 | 4.1 | 1973 | 4.1 | 1974 | 4.1 | 1975 | 1.9 |
| 1965 | 4.1 | 1966 | 4.1 | 1967 | 4.1 | 1968 | 4.1 | 1969 | 4.1 | 1970 | 4.1 | 1971 | 4.1 | 1972 | 4.1 | 1973 | 4.1 | 1974 | 4.1 | 1975 | 1.9 | 1976 | 1.9 |
| 1966 | 4.0 | 1967 | 4.0 | 1968 | 4.0 | 1969 | 4.0 | 1970 | 4.0 | 1971 | 4.0 | 1972 | 4.0 | 1973 | 4.0 | 1974 | 4.0 | 1975 | 1.9 | 1976 | 1.9 | 1977 | 1.9 |
| 1967 | 4.0 | 1968 | 4.0 | 1969 | 4.0 | 1970 | 4.0 | 1971 | 4.0 | 1972 | 4.0 | 1973 | 4.0 | 1974 | 4.0 | 1975 | 1.8 | 1976 | 1.8 | 1977 | 1.8 | 1978 | 1.8 |
| 1968 | 3.9 | 1969 | 3.9 | 1970 | 3.9 | 1971 | 3.9 | 1972 | 3.9 | 1973 | 3.9 | 1974 | 3.9 | 1975 | 1.8 | 1976 | 1.8 | 1977 | 1.8 | 1978 | 1.8 | 1979 | 1.8 |
| 1969 | 3.9 | 1970 | 3.9 | 1971 | 3.9 | 1972 | 3.9 | 1973 | 3.9 | 1974 | 3.9 | 1975 | 1.7 | 1976 | 1.7 | 1977 | 1.7 | 1978 | 1.7 | 1979 | 1.7 | 1980 | 1.0 |
| 1970 | 3.8 | 1971 | 3.8 | 1972 | 3.8 | 1973 | 3.8 | 1974 | 3.8 | 1975 | 1.7 | 1976 | 1.7 | 1977 | 1.7 | 1978 | 1.7 | 1979 | 1.7 | 1980 | 1.0 | 1981 | 1.0 |
| 1971 | 3.7 | 1972 | 3.7 | 1973 | 3.7 | 1974 | 3.7 | 1975 | 1.6 | 1976 | 1.6 | 1977 | 1.6 | 1978 | 1.6 | 1979 | 1.6 | 1980 | 0.9 | 1981 | 0.9 | 1982 | 0.7 |
| 1972 | 3.7 | 1973 | 3.7 | 1974 | 3.7 | 1975 | 1.6 | 1976 | 1.6 | 1977 | 1.6 | 1978 | 1.6 | 1979 | 1.6 | 1980 | 0.9 | 1981 | 0.9 | 1982 | 0.6 | 1983 | 0.6 |
| 1973 | 3.6 | 1974 | 3.6 | 1975 | 1.5 | 1976 | 1.5 | 1977 | 1.5 | 1978 | 1.5 | 1979 | 1.5 | 1980 | 0.9 | 1981 | 0.9 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.5 |
| 1974 | 3.5 | 1975 | 1.4 | 1976 | 1.4 | 1977 | 1.4 | 1978 | 1.4 | 1979 | 1.4 | 1980 | 0.9 | 1981 | 0.9 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.5 | 1985 | 0.5 |
| 1975 | 1.4 | 1976 | 1.4 | 1977 | 1.4 | 1978 | 1.4 | 1979 | 1.4 | 1980 | 0.8 | 1981 | 0.8 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.5 | 1985 | 0.5 | 1986 | 0.5 |
| 1976 | 1.3 | 1977 | 1.3 | 1978 | 1.3 | 1979 | 1.3 | 1980 | 0.8 | 1981 | 0.8 | 1982 | 0.5 | 1983 | 0.5 | 1984 | 0.4 | 1985 | 0.4 | 1986 | 0.4 | 1987 | 0.4 |
| 1977 | 1.2 | 1978 | 1.2 | 1979 | 1.2 | 1980 | 0.8 | 1981 | 0.8 | 1982 | 0.5 | 1983 | 0.5 | 1984 | 0.4 | 1985 | 0.4 | 1986 | 0.4 | 1987 | 0.4 | 1988 | 0.4 |
| 1978 | 1.1 | 1979 | 1.1 | 1980 | 0.7 | 1981 | 0.7 | 1982 | 0.5 | 1983 | 0.5 | 1984 | 0.4 | 1985 | 0.4 | 1986 | 0.4 | 1987 | 0.4 | 1988 | 0.4 | 1989 | 0.4 |
| 1979 | 1.0 | 1980 | 0.7 | 1981 | 0.7 | 1982 | 0.4 | 1983 | 0.4 | 1984 | 0.3 | 1985 | 0.3 | 1986 | 0.3 | 1987 | 0.3 | 1988 | 0.3 | 1989 | 0.3 | 1990 | 0.3 |
| 1980 | 0.7 | 1981 | 0.7 | 1982 | 0.4 | 1983 | 0.4 | 1984 | 0.3 | 1985 | 0.3 | 1986 | 0.3 | 1987 | 0.3 | 1988 | 0.3 | 1989 | 0.3 | 1990 | 0.3 | 1991 | 0.3 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 4.2 | 1974 | 4.2 | 1975 | 2.0 | 1976 | 2.0 | 1977 | 2.0 | 1978 | 2.0 | 1979 | 2.0 | 1980 | 1.1 | 1981 | 1.1 | 1982 | 0.9 | 1983 | 0.9 | 1984 | 0.7 |
| 1974 | 4.2 | 1975 | 2.0 | 1976 | 2.0 | 1977 | 2.0 | 1978 | 2.0 | 1979 | 2.0 | 1980 | 1.1 | 1981 | 1.1 | 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.7 | 1985 | 0.7 |
| 1975 | 2.0 | 1976 | 2.0 | 1977 | 2.0 | 1978 | 2.0 | 1979 | 2.0 | 1980 | 1.1 | 1981 | 1.1 | 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.7 | 1985 | 0.7 | 1986 | 0.7 |
| 1976 | 1.9 | 1977 | 1.9 | 1978 | 1.9 | 1979 | 1.9 | 1980 | 1.1 | 1981 | 1.1 | 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.7 | 1985 | 0.7 | 1986 | 0.7 | 1987 | 0.7 |
| 1977 | 1.9 | 1978 | 1.9 | 1979 | 1.9 | 1980 | 1.1 | 1981 | 1.1 | 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.7 | 1985 | 0.7 | 1986 | 0.7 | 1987 | 0.7 | 1988 | 0.7 |
| 1978 | 1.9 | 1979 | 1.9 | 1980 | 1.0 | 1981 | 1.0 | 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.7 | 1985 | 0.7 | 1986 | 0.7 | 1987 | 0.7 | 1988 | 0.7 | 1989 | 0.7 |
| 1979 | 1.8 | 1980 | 1.0 | 1981 | 1.0 | 1982 | 0.8 | 1983 | 0.8 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 |
| 1980 | 1.0 | 1981 | 1.0 | 1982 | 0.7 | 1983 | 0.7 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 | 1991 | 0.6 |
| 1981 | 1.0 | 1982 | 0.7 | 1983 | 0.7 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 | 1991 | 0.6 | 1992 | 0.6 |
| 1982 | 0.7 | 1983 | 0.7 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 | 1991 | 0.6 | 1992 | 0.6 | 1993 | 0.6 |
| 1983 | 0.7 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 | 1991 | 0.6 | 1992 | 0.6 | 1993 | 0.6 | 1994 | 0.6 |
| 1984 | 0.5 | 1985 | 0.5 | 1986 | 0.5 | 1987 | 0.5 | 1988 | 0.5 | 1989 | 0.5 | 1990 | 0.5 | 1991 | 0.5 | 1992 | 0.5 | 1993 | 0.5 | 1994 | 0.5 | 1995 | 0.5 |
| 1985 | 0.5 | 1986 | 0.5 | 1987 | 0.5 | 1988 | 0.5 | 1989 | 0.5 | 1990 | 0.5 | 1991 | 0.5 | 1992 | 0.5 | 1993 | 0.5 | 1994 | 0.5 | 1995 | 0.5 | 1996 | 0.5 |
| 1986 | 0.5 | 1987 | 0.5 | 1988 | 0.5 | 1989 | 0.5 | 1990 | 0.5 | 1991 | 0.5 | 1992 | 0.5 | 1993 | 0.5 | 1994 | 0.5 | 1995 | 0.5 | 1996 | 0.5 | 1997 | 0.5 |
| 1987 | 0.5 | 1988 | 0.5 | 1989 | 0.5 | 1990 | 0.5 | 1991 | 0.5 | 1992 | 0.5 | 1993 | 0.5 | 1994 | 0.5 | 1995 | 0.5 | 1996 | 0.5 | 1997 | 0.5 | 1998 | 0.5 |
| 1988 | 0.4 | 1989 | 0.4 | 1990 | 0.4 | 1991 | 0.4 | 1992 | 0.4 | 1993 | 0.4 | 1994 | 0.4 | 1995 | 0.4 | 1996 | 0.4 | 1997 | 0.4 | 1998 | 0.4 | 1999 | 0.4 |
| 1989 | 0.4 | 1990 | 0.4 | 1991 | 0.4 | 1992 | 0.4 | 1993 | 0.4 | 1994 | 0.4 | 1995 | 0.4 | 1996 | 0.4 | 1997 | 0.4 | 1998 | 0.4 | 1999 | 0.4 | 2000 | 0.4 |
| 1990 | 0.4 | 1991 | 0.4 | 1992 | 0.4 | 1993 | 0.4 | 1994 | 0.4 | 1995 | 0.4 | 1996 | 0.4 | 1997 | 0.4 | 1998 | 0.4 | 1999 | 0.4 | 2000 | 0.4 | 2001 | 0.4 |
| 1991 | 0.3 | 1992 | 0.3 | 1993 | 0.3 | 1994 | 0.3 | 1995 | 0.3 | 1996 | 0.3 | 1997 | 0.3 | 1998 | 0.3 | 1999 | 0.3 | 2000 | 0.3 | 2001 | 0.3 | 2002 | 0.3 |
| 1992 | 0.3 | 1993 | 0.3 | 1994 | 0.3 | 1995 | 0.3 | 1996 | 0.3 | 1997 | 0.3 | 1998 | 0.3 | 1999 | 0.3 | 2000 | 0.3 | 2001 | 0.3 | 2002 | 0.3 | 2003 | 0.3 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.5.4.

TABLE 2.5.2B

DATE : MAY 25, 1985

# EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
# LIGHT DUTY DIESEL POWERED VEHICLES
## CO

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 6.7 | 1962 | 6.7 | 1963 | 6.7 | 1964 | 6.7 | 1965 | 6.7 | 1966 | 6.7 | 1967 | 6.7 | 1968 | 6.7 | 1969 | 6.7 | 1970 | 6.7 | 1971 | 6.7 | 1972 | 6.7 |
| 1962 | 6.7 | 1963 | 6.7 | 1964 | 6.7 | 1965 | 6.7 | 1966 | 6.7 | 1967 | 6.7 | 1968 | 6.7 | 1969 | 6.7 | 1970 | 6.7 | 1971 | 6.7 | 1972 | 6.7 | 1973 | 6.7 |
| 1963 | 6.6 | 1964 | 6.6 | 1965 | 6.6 | 1966 | 6.6 | 1967 | 6.6 | 1968 | 6.6 | 1969 | 6.6 | 1970 | 6.6 | 1971 | 6.6 | 1972 | 6.6 | 1973 | 6.6 | 1974 | 6.6 |
| 1964 | 6.5 | 1965 | 6.5 | 1966 | 6.5 | 1967 | 6.5 | 1968 | 6.5 | 1969 | 6.5 | 1970 | 6.5 | 1971 | 6.5 | 1972 | 6.5 | 1973 | 6.5 | 1974 | 6.5 | 1975 | 3.3 |
| 1965 | 6.5 | 1966 | 6.5 | 1967 | 6.5 | 1968 | 6.5 | 1969 | 6.5 | 1970 | 6.5 | 1971 | 6.5 | 1972 | 6.5 | 1973 | 6.5 | 1974 | 6.5 | 1975 | 3.2 | 1976 | 3.2 |
| 1966 | 6.4 | 1967 | 6.4 | 1968 | 6.4 | 1969 | 6.4 | 1970 | 6.4 | 1971 | 6.4 | 1972 | 6.4 | 1973 | 6.4 | 1974 | 6.4 | 1975 | 3.2 | 1976 | 3.2 | 1977 | 3.2 |
| 1967 | 6.3 | 1968 | 6.3 | 1969 | 6.3 | 1970 | 6.3 | 1971 | 6.3 | 1972 | 6.3 | 1973 | 6.3 | 1974 | 6.3 | 1975 | 3.1 | 1976 | 3.1 | 1977 | 3.1 | 1978 | 3.1 |
| 1968 | 6.2 | 1969 | 6.2 | 1970 | 6.2 | 1971 | 6.2 | 1972 | 6.2 | 1973 | 6.2 | 1974 | 6.2 | 1975 | 3.1 | 1976 | 3.1 | 1977 | 3.1 | 1978 | 3.1 | 1979 | 3.1 |
| 1969 | 6.1 | 1970 | 6.1 | 1971 | 6.1 | 1972 | 6.1 | 1973 | 6.1 | 1974 | 6.1 | 1975 | 3.0 | 1976 | 3.0 | 1977 | 3.0 | 1978 | 3.0 | 1979 | 3.0 | 1980 | 2.4 |
| 1970 | 6.0 | 1971 | 6.0 | 1972 | 6.0 | 1973 | 6.0 | 1974 | 6.0 | 1975 | 2.9 | 1976 | 2.9 | 1977 | 2.9 | 1978 | 2.9 | 1979 | 2.9 | 1980 | 2.4 | 1981 | 2.4 |
| 1971 | 5.9 | 1972 | 5.9 | 1973 | 5.9 | 1974 | 5.9 | 1975 | 2.9 | 1976 | 2.9 | 1977 | 2.9 | 1978 | 2.9 | 1979 | 2.9 | 1980 | 2.4 | 1981 | 2.4 | 1982 | 2.4 |
| 1972 | 5.8 | 1973 | 5.8 | 1974 | 5.8 | 1975 | 2.8 | 1976 | 2.8 | 1977 | 2.8 | 1978 | 2.8 | 1979 | 2.8 | 1980 | 2.3 | 1981 | 2.3 | 1982 | 2.3 | 1983 | 2.3 |
| 1973 | 5.7 | 1974 | 5.7 | 1975 | 2.7 | 1976 | 2.7 | 1977 | 2.7 | 1978 | 2.7 | 1979 | 2.7 | 1980 | 2.3 | 1981 | 2.3 | 1982 | 2.3 | 1983 | 2.3 | 1984 | 1.4 |
| 1974 | 5.6 | 1975 | 2.6 | 1976 | 2.6 | 1977 | 2.6 | 1978 | 2.6 | 1979 | 2.6 | 1980 | 2.3 | 1981 | 2.3 | 1982 | 2.3 | 1983 | 2.3 | 1984 | 1.4 | 1985 | 1.4 |
| 1975 | 2.5 | 1976 | 2.5 | 1977 | 2.5 | 1978 | 2.5 | 1979 | 2.5 | 1980 | 2.2 | 1981 | 2.2 | 1982 | 2.2 | 1983 | 2.2 | 1984 | 1.4 | 1985 | 1.4 | 1986 | 1.4 |
| 1976 | 2.5 | 1977 | 2.5 | 1978 | 2.5 | 1979 | 2.5 | 1980 | 2.2 | 1981 | 2.2 | 1982 | 2.2 | 1983 | 2.2 | 1984 | 1.3 | 1985 | 1.3 | 1986 | 1.3 | 1987 | 1.3 |
| 1977 | 2.4 | 1978 | 2.4 | 1979 | 2.4 | 1980 | 2.1 | 1981 | 2.1 | 1982 | 2.1 | 1983 | 2.1 | 1984 | 1.3 | 1985 | 1.3 | 1986 | 1.3 | 1987 | 1.3 | 1988 | 1.3 |
| 1978 | 2.3 | 1979 | 2.3 | 1980 | 2.1 | 1981 | 2.1 | 1982 | 2.1 | 1983 | 2.1 | 1984 | 1.2 | 1985 | 1.2 | 1986 | 1.2 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 |
| 1979 | 2.1 | 1980 | 2.1 | 1981 | 2.1 | 1982 | 2.1 | 1983 | 2.1 | 1984 | 1.2 | 1985 | 1.2 | 1986 | 1.2 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 |
| 1980 | 2.0 | 1981 | 2.0 | 1982 | 2.0 | 1983 | 2.0 | 1984 | 1.2 | 1985 | 1.2 | 1986 | 1.2 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 | 1991 | 1.2 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 6.7 | 1974 | 6.7 | 1975 | 3.4 | 1976 | 3.4 | 1977 | 3.4 | 1978 | 3.4 | 1979 | 3.4 | 1980 | 2.6 | 1981 | 2.6 | 1982 | 2.6 | 1983 | 2.6 | 1984 | 1.8 |
| 1974 | 6.7 | 1975 | 3.4 | 1976 | 3.4 | 1977 | 3.4 | 1978 | 3.4 | 1979 | 3.4 | 1980 | 2.6 | 1981 | 2.6 | 1982 | 2.6 | 1983 | 2.6 | 1984 | 1.7 | 1985 | 1.7 |
| 1975 | 3.3 | 1976 | 3.3 | 1977 | 3.3 | 1978 | 3.3 | 1979 | 3.3 | 1980 | 2.6 | 1981 | 2.6 | 1982 | 2.6 | 1983 | 2.6 | 1984 | 1.7 | 1985 | 1.7 | 1986 | 1.7 |
| 1976 | 3.3 | 1977 | 3.3 | 1978 | 3.3 | 1979 | 3.3 | 1980 | 2.6 | 1981 | 2.6 | 1982 | 2.6 | 1983 | 2.6 | 1984 | 1.7 | 1985 | 1.7 | 1986 | 1.7 | 1987 | 1.7 |
| 1977 | 3.2 | 1978 | 3.2 | 1979 | 3.2 | 1980 | 2.5 | 1981 | 2.5 | 1982 | 2.5 | 1983 | 2.5 | 1984 | 1.7 | 1985 | 1.7 | 1986 | 1.7 | 1987 | 1.7 | 1988 | 1.7 |
| 1978 | 3.2 | 1979 | 3.2 | 1980 | 2.5 | 1981 | 2.5 | 1982 | 2.5 | 1983 | 2.5 | 1984 | 1.7 | 1985 | 1.7 | 1986 | 1.7 | 1987 | 1.7 | 1988 | 1.7 | 1989 | 1.7 |
| 1979 | 3.1 | 1980 | 2.5 | 1981 | 2.5 | 1982 | 2.5 | 1983 | 2.5 | 1984 | 1.6 | 1985 | 1.6 | 1986 | 1.6 | 1987 | 1.6 | 1988 | 1.6 | 1989 | 1.6 | 1990 | 1.6 |
| 1980 | 2.5 | 1981 | 2.5 | 1982 | 2.5 | 1983 | 2.5 | 1984 | 1.6 | 1985 | 1.6 | 1986 | 1.6 | 1987 | 1.6 | 1988 | 1.6 | 1989 | 1.6 | 1990 | 1.6 | 1991 | 1.6 |
| 1981 | 2.4 | 1982 | 2.4 | 1983 | 2.4 | 1984 | 1.6 | 1985 | 1.6 | 1986 | 1.6 | 1987 | 1.6 | 1988 | 1.6 | 1989 | 1.6 | 1990 | 1.6 | 1991 | 1.6 | 1992 | 1.6 |
| 1982 | 2.4 | 1983 | 2.4 | 1984 | 1.5 | 1985 | 1.5 | 1986 | 1.5 | 1987 | 1.5 | 1988 | 1.5 | 1989 | 1.5 | 1990 | 1.5 | 1991 | 1.5 | 1992 | 1.5 | 1993 | 1.5 |
| 1983 | 2.4 | 1984 | 1.5 | 1985 | 1.5 | 1986 | 1.5 | 1987 | 1.5 | 1988 | 1.5 | 1989 | 1.5 | 1990 | 1.5 | 1991 | 1.5 | 1992 | 1.5 | 1993 | 1.5 | 1994 | 1.5 |
| 1984 | 1.5 | 1985 | 1.5 | 1986 | 1.5 | 1987 | 1.5 | 1988 | 1.5 | 1989 | 1.5 | 1990 | 1.5 | 1991 | 1.5 | 1992 | 1.5 | 1993 | 1.5 | 1994 | 1.5 | 1995 | 1.5 |
| 1985 | 1.4 | 1986 | 1.4 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 | 1991 | 1.4 | 1992 | 1.4 | 1993 | 1.4 | 1994 | 1.4 | 1995 | 1.4 | 1996 | 1.4 |
| 1986 | 1.4 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 | 1991 | 1.4 | 1992 | 1.4 | 1993 | 1.4 | 1994 | 1.4 | 1995 | 1.4 | 1996 | 1.4 | 1997 | 1.4 |
| 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 | 1991 | 1.4 | 1992 | 1.4 | 1993 | 1.4 | 1994 | 1.4 | 1995 | 1.4 | 1996 | 1.4 | 1997 | 1.4 | 1998 | 1.4 |
| 1988 | 1.3 | 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 | 1993 | 1.3 | 1994 | 1.3 | 1995 | 1.3 | 1996 | 1.3 | 1997 | 1.3 | 1998 | 1.3 | 1999 | 1.3 |
| 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 | 1993 | 1.3 | 1994 | 1.3 | 1995 | 1.3 | 1996 | 1.3 | 1997 | 1.3 | 1998 | 1.3 | 1999 | 1.3 | 2000 | 1.3 |
| 1990 | 1.2 | 1991 | 1.2 | 1992 | 1.2 | 1993 | 1.2 | 1994 | 1.2 | 1995 | 1.2 | 1996 | 1.2 | 1997 | 1.2 | 1998 | 1.2 | 1999 | 1.2 | 2000 | 1.2 | 2001 | 1.2 |
| 1991 | 1.2 | 1992 | 1.2 | 1993 | 1.2 | 1994 | 1.2 | 1995 | 1.2 | 1996 | 1.2 | 1997 | 1.2 | 1998 | 1.2 | 1999 | 1.2 | 2000 | 1.2 | 2001 | 1.2 | 2002 | 1.2 |
| 1992 | 1.2 | 1993 | 1.2 | 1994 | 1.2 | 1995 | 1.2 | 1996 | 1.2 | 1997 | 1.2 | 1998 | 1.2 | 1999 | 1.2 | 2000 | 1.2 | 2001 | 1.2 | 2002 | 1.2 | 2003 | 1.2 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.5.4.

## TABLE 2.5.2C

DATE : MAY 25, 1985

### EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
### LIGHT DUTY DIESEL POWERED VEHICLES
### NOx

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 2.1 | 1962 | 2.1 | 1963 | 2.1 | 1964 | 2.1 | 1965 | 2.1 | 1966 | 2.1 | 1967 | 2.1 | 1968 | 2.1 | 1969 | 2.1 | 1970 | 2.1 | 1971 | 2.1 | 1972 | 2.1 |
| 1962 | 2.0 | 1963 | 2.0 | 1964 | 2.0 | 1965 | 2.0 | 1966 | 2.0 | 1967 | 2.0 | 1968 | 2.0 | 1969 | 2.0 | 1970 | 2.0 | 1971 | 2.0 | 1972 | 2.0 | 1973 | 2.0 |
| 1963 | 2.0 | 1964 | 2.0 | 1965 | 2.0 | 1966 | 2.0 | 1967 | 2.0 | 1968 | 2.0 | 1969 | 2.0 | 1970 | 2.0 | 1971 | 2.0 | 1972 | 2.0 | 1973 | 2.0 | 1974 | 2.0 |
| 1964 | 2.0 | 1965 | 2.0 | 1966 | 2.0 | 1967 | 2.0 | 1968 | 2.0 | 1969 | 2.0 | 1970 | 2.0 | 1971 | 2.0 | 1972 | 2.0 | 1973 | 2.0 | 1974 | 2.0 | 1975 | 1.9 |
| 1965 | 2.0 | 1966 | 2.0 | 1967 | 2.0 | 1968 | 2.0 | 1969 | 2.0 | 1970 | 2.0 | 1971 | 2.0 | 1972 | 2.0 | 1973 | 2.0 | 1974 | 2.0 | 1975 | 1.9 | 1976 | 1.9 |
| 1966 | 2.0 | 1967 | 2.0 | 1968 | 2.0 | 1969 | 2.0 | 1970 | 2.0 | 1971 | 2.0 | 1972 | 2.0 | 1973 | 2.0 | 1974 | 2.0 | 1975 | 1.9 | 1976 | 1.9 | 1977 | 1.9 |
| 1967 | 1.9 | 1968 | 1.9 | 1969 | 1.9 | 1970 | 1.9 | 1971 | 1.9 | 1972 | 1.9 | 1973 | 1.9 | 1974 | 1.9 | 1975 | 1.9 | 1976 | 1.9 | 1977 | 1.9 | 1978 | 1.9 |
| 1968 | 1.9 | 1969 | 1.9 | 1970 | 1.9 | 1971 | 1.9 | 1972 | 1.9 | 1973 | 1.9 | 1974 | 1.9 | 1975 | 1.8 | 1976 | 1.8 | 1977 | 1.8 | 1978 | 1.8 | 1979 | 1.8 |
| 1969 | 1.9 | 1970 | 1.9 | 1971 | 1.9 | 1972 | 1.9 | 1973 | 1.9 | 1974 | 1.9 | 1975 | 1.8 | 1976 | 1.8 | 1977 | 1.8 | 1978 | 1.8 | 1979 | 1.8 | 1980 | 1.8 |
| 1970 | 1.8 | 1971 | 1.8 | 1972 | 1.8 | 1973 | 1.8 | 1974 | 1.8 | 1975 | 1.8 | 1976 | 1.8 | 1977 | 1.8 | 1978 | 1.8 | 1979 | 1.8 | 1980 | 1.8 | 1981 | 1.6 |
| 1971 | 1.8 | 1972 | 1.8 | 1973 | 1.8 | 1974 | 1.8 | 1975 | 1.8 | 1976 | 1.8 | 1977 | 1.8 | 1978 | 1.8 | 1979 | 1.8 | 1980 | 1.8 | 1981 | 1.6 | 1982 | 1.6 |
| 1972 | 1.8 | 1973 | 1.8 | 1974 | 1.8 | 1975 | 1.7 | 1976 | 1.7 | 1977 | 1.7 | 1978 | 1.7 | 1979 | 1.7 | 1980 | 1.7 | 1981 | 1.6 | 1982 | 1.6 | 1983 | 1.6 |
| 1973 | 1.7 | 1974 | 1.7 | 1975 | 1.7 | 1976 | 1.7 | 1977 | 1.7 | 1978 | 1.7 | 1979 | 1.7 | 1980 | 1.7 | 1981 | 1.5 | 1982 | 1.5 | 1983 | 1.5 | 1984 | 1.5 |
| 1974 | 1.7 | 1975 | 1.7 | 1976 | 1.7 | 1977 | 1.7 | 1978 | 1.7 | 1979 | 1.7 | 1980 | 1.7 | 1981 | 1.5 | 1982 | 1.5 | 1983 | 1.5 | 1984 | 1.5 | 1985 | 1.1 |
| 1975 | 1.6 | 1976 | 1.6 | 1977 | 1.6 | 1978 | 1.6 | 1979 | 1.6 | 1980 | 1.6 | 1981 | 1.5 | 1982 | 1.5 | 1983 | 1.5 | 1984 | 1.5 | 1985 | 1.0 | 1986 | 1.0 |
| 1976 | 1.6 | 1977 | 1.6 | 1978 | 1.6 | 1979 | 1.6 | 1980 | 1.6 | 1981 | 1.4 | 1982 | 1.4 | 1983 | 1.4 | 1984 | 1.4 | 1985 | 1.0 | 1986 | 1.0 | 1987 | 1.0 |
| 1977 | 1.5 | 1978 | 1.5 | 1979 | 1.5 | 1980 | 1.5 | 1981 | 1.4 | 1982 | 1.4 | 1983 | 1.4 | 1984 | 1.4 | 1985 | 1.0 | 1986 | 1.0 | 1987 | 1.0 | 1988 | 1.0 |
| 1978 | 1.5 | 1979 | 1.5 | 1980 | 1.5 | 1981 | 1.4 | 1982 | 1.4 | 1983 | 1.4 | 1984 | 1.4 | 1985 | 0.9 | 1986 | 0.9 | 1987 | 0.9 | 1988 | 0.9 | 1989 | 0.9 |
| 1979 | 1.4 | 1980 | 1.4 | 1981 | 1.3 | 1982 | 1.3 | 1983 | 1.3 | 1984 | 1.3 | 1985 | 0.9 | 1986 | 0.9 | 1987 | 0.9 | 1988 | 0.9 | 1989 | 0.9 | 1990 | 0.9 |
| 1980 | 1.4 | 1981 | 1.3 | 1982 | 1.3 | 1983 | 1.3 | 1984 | 1.3 | 1985 | 0.9 | 1986 | 0.9 | 1987 | 0.9 | 1988 | 0.9 | 1989 | 0.9 | 1990 | 0.9 | 1991 | 0.9 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 2.1 | 1974 | 2.1 | 1975 | 2.0 | 1976 | 2.0 | 1977 | 2.0 | 1978 | 2.0 | 1979 | 2.0 | 1980 | 2.0 | 1981 | 1.8 | 1982 | 1.8 | 1983 | 1.8 | 1984 | 1.8 |
| 1974 | 2.0 | 1975 | 2.0 | 1976 | 2.0 | 1977 | 2.0 | 1978 | 2.0 | 1979 | 2.0 | 1980 | 2.0 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.7 | 1985 | 1.3 |
| 1975 | 2.0 | 1976 | 2.0 | 1977 | 2.0 | 1978 | 2.0 | 1979 | 2.0 | 1980 | 2.0 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.7 | 1985 | 1.3 | 1986 | 1.3 |
| 1976 | 1.9 | 1977 | 1.9 | 1978 | 1.9 | 1979 | 1.9 | 1980 | 1.9 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.7 | 1985 | 1.3 | 1986 | 1.3 | 1987 | 1.3 |
| 1977 | 1.9 | 1978 | 1.9 | 1979 | 1.9 | 1980 | 1.9 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.7 | 1985 | 1.3 | 1986 | 1.3 | 1987 | 1.3 | 1988 | 1.3 |
| 1978 | 1.9 | 1979 | 1.9 | 1980 | 1.9 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.7 | 1985 | 1.2 | 1986 | 1.2 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 |
| 1979 | 1.9 | 1980 | 1.9 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.7 | 1985 | 1.2 | 1986 | 1.2 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 |
| 1980 | 1.8 | 1981 | 1.6 | 1982 | 1.6 | 1983 | 1.6 | 1984 | 1.6 | 1985 | 1.2 | 1986 | 1.2 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 | 1991 | 1.2 |
| 1981 | 1.6 | 1982 | 1.6 | 1983 | 1.6 | 1984 | 1.6 | 1985 | 1.2 | 1986 | 1.2 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 | 1991 | 1.2 | 1992 | 1.2 |
| 1982 | 1.6 | 1983 | 1.6 | 1984 | 1.6 | 1985 | 1.2 | 1986 | 1.2 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 | 1991 | 1.2 | 1992 | 1.2 | 1993 | 1.2 |
| 1983 | 1.6 | 1984 | 1.6 | 1985 | 1.1 | 1986 | 1.1 | 1987 | 1.1 | 1988 | 1.1 | 1989 | 1.1 | 1990 | 1.1 | 1991 | 1.1 | 1992 | 1.1 | 1993 | 1.1 | 1994 | 1.1 |
| 1984 | 1.6 | 1985 | 1.1 | 1986 | 1.1 | 1987 | 1.1 | 1988 | 1.1 | 1989 | 1.1 | 1990 | 1.1 | 1991 | 1.1 | 1992 | 1.1 | 1993 | 1.1 | 1994 | 1.1 | 1995 | 1.1 |
| 1985 | 1.1 | 1986 | 1.1 | 1987 | 1.1 | 1988 | 1.1 | 1989 | 1.1 | 1990 | 1.1 | 1991 | 1.1 | 1992 | 1.1 | 1993 | 1.1 | 1994 | 1.1 | 1995 | 1.1 | 1996 | 1.1 |
| 1986 | 1.1 | 1987 | 1.1 | 1988 | 1.1 | 1989 | 1.1 | 1990 | 1.1 | 1991 | 1.1 | 1992 | 1.1 | 1993 | 1.1 | 1994 | 1.1 | 1995 | 1.1 | 1996 | 1.1 | 1997 | 1.1 |
| 1987 | 1.0 | 1988 | 1.0 | 1989 | 1.0 | 1990 | 1.0 | 1991 | 1.0 | 1992 | 1.0 | 1993 | 1.0 | 1994 | 1.0 | 1995 | 1.0 | 1996 | 1.0 | 1997 | 1.0 | 1998 | 1.0 |
| 1988 | 1.0 | 1989 | 1.0 | 1990 | 1.0 | 1991 | 1.0 | 1992 | 1.0 | 1993 | 1.0 | 1994 | 1.0 | 1995 | 1.0 | 1996 | 1.0 | 1997 | 1.0 | 1998 | 1.0 | 1999 | 1.0 |
| 1989 | 1.0 | 1990 | 1.0 | 1991 | 1.0 | 1992 | 1.0 | 1993 | 1.0 | 1994 | 1.0 | 1995 | 1.0 | 1996 | 1.0 | 1997 | 1.0 | 1998 | 1.0 | 1999 | 1.0 | 2000 | 1.0 |
| 1990 | 0.9 | 1991 | 0.9 | 1992 | 0.9 | 1993 | 0.9 | 1994 | 0.9 | 1995 | 0.9 | 1996 | 0.9 | 1997 | 0.9 | 1998 | 0.9 | 1999 | 0.9 | 2000 | 0.9 | 2001 | 0.9 |
| 1991 | 0.9 | 1992 | 0.9 | 1993 | 0.9 | 1994 | 0.9 | 1995 | 0.9 | 1996 | 0.9 | 1997 | 0.9 | 1998 | 0.9 | 1999 | 0.9 | 2000 | 0.9 | 2001 | 0.9 | 2002 | 0.9 |
| 1992 | 0.9 | 1993 | 0.9 | 1994 | 0.9 | 1995 | 0.9 | 1996 | 0.9 | 1997 | 0.9 | 1998 | 0.9 | 1999 | 0.9 | 2000 | 0.9 | 2001 | 0.9 | 2002 | 0.9 | 2003 | 0.9 |

*MY -- Indicates the model year

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions. 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.5.4.

## TABLE 2.5.3

## IDLE EMISSION RATES FOR
## HIGH ALTITUDE
## LIGHT DUTY DIESEL POWERED VEHICLES

* IER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Min.) | Deterioration Rate (Gm/Min/10K Mi) |
|---|---|---|---|
| HC | Pre-1975 | 0.32 | 0.01 |
| | 1975-1976 | 0.07 | 0.0 |
| | 1977 | 0.09 | 0.0 |
| | 1978 | 0.14 | 0.0 |
| | 1979 | 0.12 | 0.0 |
| | 1980-1981 | 0.07 | 0.0 |
| | 1982-1983 | 0.04 | 0.0 |
| | 1984+ | 0.03 | 0.0 |
| CO | Pre-1975 | 0.40 | 0.01 |
| | 1975-1976 | 0.25 | 0.01 |
| | 1977 | 0.28 | 0.01 |
| | 1978 | 0.30 | 0.01 |
| | 1979 | 0.32 | 0.01 |
| | 1980-1981 | 0.26 | 0.01 |
| | 1982-1983 | 0.26 | 0.01 |
| | 1984+ | 0.15 | 0.01 |
| NOx | Pre-1975 | 0.13 | 0.0 |
| | 1975-1976 | 0.22 | 0.0 |
| | 1977 | 0.17 | 0.01 |
| | 1978 | 0.20 | 0.01 |
| | 1979 | 0.18 | 0.01 |
| | 1980 | 0.19 | 0.01 |
| | 1981-1984 | 0.14 | 0.01 |
| | 1985+ | 0.09 | 0.01 |

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

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## TABLE 2.5.4

## REGISTRATION MIX AND MILEAGE ACCUMULATION RATES FOR HIGH ALTITUDE LIGHT DUTY DIESEL POWERED VEHICLES

| Model Year Index** | July 1 Registration Mix* | Mileage Accumulation Rate per vehicle* | Jan 1 Registration Mix | Jan 1 Mileage Accumulation Rate (fleet) | Jan 1 Mileage Accumulation (fleet) |
|---|---|---|---|---|---|
| 1 | 0.080 | 12818. | 0.027 | 12818. | 1602. |
| 2 | 0.101 | 12102. | 0.101 | 12639. | 9591. |
| 3 | 0.095 | 11427. | 0.095 | 11933. | 21873. |
| 4 | 0.089 | 10789. | 0.089 | 11267. | 33470. |
| 5 | 0.083 | 10187. | 0.083 | 10638. | 44420. |
| 6 | 0.077 | 9619. | 0.077 | 10045. | 54758. |
| 7 | 0.071 | 9082. | 0.071 | 9485. | 64520. |
| 8 | 0.065 | 8575. | 0.065 | 8955. | 73738. |
| 9 | 0.059 | 8096. | 0.059 | 8455. | 82440. |
| 10 | 0.053 | 7645. | 0.053 | 7983. | 90657. |
| 11 | 0.047 | 7218. | 0.047 | 7538. | 98415. |
| 12 | 0.041 | 6815. | 0.041 | 7117. | 105740. |
| 13 | 0.035 | 6435. | 0.035 | 6720. | 112657. |
| 14 | 0.029 | 6076. | 0.029 | 6345. | 119187. |
| 15 | 0.023 | 5737. | 0.023 | 5991. | 125354. |
| 16 | 0.017 | 5416. | 0.017 | 5657. | 131176. |
| 17 | 0.011 | 5114. | 0.011 | 5340. | 136673. |
| 18 | 0.008 | 4829. | 0.008 | 5043. | 141863. |
| 19 | 0.006 | 4559. | 0.006 | 4761. | 146763. |
| 20+ | 0.008 | 4305. | 0.008 | 4495. | 151390. |

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

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## TABLE 2.5.5

## EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR HIGH ALTITUDE LIGHT DUTY DIESEL POWERED VEHICLES JANUARY 1, 1988

| Model Years | (A) LDV Fleet Registration | (B) Sales Fraction | (A*B) | (C=A*B/DAF) LDDV Registration | (D) Annual Mileage Accrual Rate | (C*D) | (C*D/TFNORM) Travel Fractions |
|---|---|---|---|---|---|---|---|
| 1988 | 0.027 | 0.090 | 0.002 | 0.055 | 12818. | 701.6 | 0.065 |
| 1987 | 0.101 | 0.080 | 0.008 | 0.184 | 12639. | 2328.9 | 0.214 |
| 1986 | 0.095 | 0.073 | 0.007 | 0.158 | 11933. | 1887.3 | 0.174 |
| 1985 | 0.089 | 0.066 | 0.006 | 0.134 | 11267. | 1509.4 | 0.139 |
| 1984 | 0.083 | 0.060 | 0.005 | 0.114 | 10638. | 1208.2 | 0.111 |
| 1983 | 0.077 | 0.053 | 0.004 | 0.093 | 10045. | 934.9 | 0.086 |
| 1982 | 0.071 | 0.046 | 0.003 | 0.074 | 9485. | 706.4 | 0.065 |
| 1981 | 0.065 | 0.061 | 0.004 | 0.090 | 8955. | 809.8 | 0.074 |
| 1980 | 0.059 | 0.034 | 0.002 | 0.046 | 8455. | 386.8 | 0.036 |
| 1979 | 0.053 | 0.028 | 0.001 | 0.034 | 7983. | 270.2 | 0.025 |
| 1978 | 0.047 | 0.009 | 0.000 | 0.010 | 7538. | 72.7 | 0.007 |
| 1977 | 0.041 | 0.004 | 0.000 | 0.004 | 7117. | 26.6 | 0.002 |
| 1976 | 0.035 | 0.003 | 0.000 | 0.002 | 6720. | 16.1 | 0.001 |
| 1975 | 0.029 | 0.003 | 0.000 | 0.002 | 6345. | 12.6 | 0.001 |
| 1974 | 0.023 | 0.0 | 0.0 | 0.0 | 5991. | 0.0 | 0.0 |
| 1973 | 0.017 | 0.0 | 0.0 | 0.0 | 5657. | 0.0 | 0.0 |
| 1972 | 0.011 | 0.0 | 0.0 | 0.0 | 5340. | 0.0 | 0.0 |
| 1971 | 0.008 | 0.0 | 0.0 | 0.0 | 5043. | 0.0 | 0.0 |
| 1970 | 0.006 | 0.0 | 0.0 | 0.0 | 4761. | 0.0 | 0.0 |
| 1969- | 0.008 | 0.0 | 0.0 | 0.0 | 4495. | 0.0 | 0.0 |
|  |  | DAF: | 0.044 |  | TFNORM: | 10871.3 |  |

WHERE :

A = January 1 registration mix from Table 2.5.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 2.5.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI) = .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

NOTE : In general, the travel weighting fractions will change for every calendar year since the sales fraction (column B) changes for almost every model year.

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## TABLE 2.5.6

## SPEED CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE LIGHT DUTY DIESEL POWERED VEHICLES

$$* \; SCF(s,sadj) = SF(s)/SF(sadj)$$

$$SF(s) = EXP(A + B*s + C*s^2)$$

| Pol | Model Years | Coefficients A | B | C |
|---|---|---|---|---|
| HC | All | 0.90900 | -0.05500 | 0.00044 |
| CO | All | 1.37520 | -0.08800 | 0.00091 |
| NOx | All | 0.66800 | -0.04800 | 0.00071 |

* WHERE :
s = average speed (mph)
sadj = basic test procedure speed; adjusted for fraction of cold start operation x and fraction of hot start operation w,
$[\, 1/sadj = (w+x)/26 + (1-w-x)/16 \,]$

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## TABLE 2.5.7

## NORMALIZED BAG FRACTIONS FOR HIGH ALTITUDE LIGHT DUTY DIESEL POWERED VEHICLES

| | | Normalized Fractions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Model | Test Seg.#1 | | Test Seg.#2 | | Test Seg.#3 | | Total Test | |
| Pol | Years | B1 | D1 | B2 | D2 | B3 | D3 | B0 | D0 |
| HC | Pre-1975 | 1.209 | 0.071 | 1.073 | 0.056 | 0.703 | 0.064 | 1.000 | 0.061 |
| | 1975-1976 | 1.209 | 0.105 | 1.073 | 0.084 | 0.703 | 0.088 | 1.000 | 0.098 |
| | 1977 | 1.209 | 0.105 | 1.073 | 0.084 | 0.703 | 0.088 | 1.000 | 0.098 |
| | 1978 | 1.209 | 0.105 | 1.073 | 0.084 | 0.703 | 0.088 | 1.000 | 0.098 |
| | 1979 | 1.209 | 0.105 | 1.073 | 0.084 | 0.703 | 0.088 | 1.000 | 0.098 |
| | 1980+ | 1.345 | 0.103 | 0.966 | 0.138 | 0.793 | 0.103 | 1.000 | 0.138 |
| CO | Pre-1975 | 1.199 | 0.060 | 0.935 | 0.042 | 0.974 | 0.051 | 1.000 | 0.048 |
| | 1975-1976 | 1.199 | 0.067 | 0.935 | 0.048 | 0.974 | 0.057 | 1.000 | 0.054 |
| | 1977 | 1.199 | 0.067 | 0.935 | 0.048 | 0.974 | 0.057 | 1.000 | 0.054 |
| | 1978 | 1.199 | 0.067 | 0.935 | 0.048 | 0.974 | 0.057 | 1.000 | 0.054 |
| | 1979 | 1.199 | 0.067 | 0.935 | 0.048 | 0.974 | 0.057 | 1.000 | 0.054 |
| | 1980+ | 1.157 | 0.061 | 1.000 | 0.026 | 0.904 | 0.035 | 1.000 | 0.035 |
| NOx | Pre-1975 | 1.068 | 0.026 | 0.981 | 0.029 | 0.985 | 0.026 | 1.000 | 0.028 |
| | 1975-1976 | 1.068 | 0.031 | 0.981 | 0.033 | 0.985 | 0.030 | 1.000 | 0.032 |
| | 1977 | 1.068 | 0.031 | 0.981 | 0.033 | 0.985 | 0.030 | 1.000 | 0.032 |
| | 1978 | 1.068 | 0.031 | 0.981 | 0.033 | 0.985 | 0.030 | 1.000 | 0.032 |
| | 1979 | 1.068 | 0.031 | 0.981 | 0.033 | 0.985 | 0.030 | 1.000 | 0.032 |
| | 1980 | 0.969 | 0.031 | 1.062 | 0.047 | 0.906 | 0.031 | 1.000 | 0.039 |
| | 1981-1982 | 0.969 | 0.031 | 1.062 | 0.047 | 0.906 | 0.031 | 1.000 | 0.039 |
| | 1983+ | 0.969 | 0.031 | 1.062 | 0.047 | 0.906 | 0.031 | 1.000 | 0.039 |

NOTE : The fractions given in this table are used in the calculation of the operating-mode/ temperature correction factor (OMTCF).

WHERE : OMTCF = ((TERM1 + TERM2 + TERM3)/DENOM)
TERM1 = W *TCF(1)*(B1+D1*M)
TERM2 = (1-W-X)*TCF(2)*(B2+D2*M)
TERM3 = X *TCF(3)*(B3+D3*M)
DENOM = B0 + D0*M
W = Fraction of VMT in the cold start mode
X = Fraction of VMT in the hot start mode
TCF(b) = Temperature correction factor for pollutant, model year; for test segment b
M = Cumulative mileage / 10,000

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## TABLE 2.6.1

## EXHAUST EMISSION RATES FOR
## HIGH ALTITUDE
## LIGHT DUTY DIESEL POWERED TRUCKS
## (RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Mile) | Deterioration Rate (Gm/Mi/10K Mi) | 50,000 Mile Emission Level (Grams/Mile) |
|---|---|---|---|---|
| HC | Pre-1978 | 1.98 | 0.08 | 2.38 |
| | 1978 | 1.98 | 0.08 | 2.38 |
| | 1979-1980 | 1.98 | 0.08 | 2.38 |
| | 1981-1983 | 0.99 | 0.04 | 1.19 |
| | 1984+ | 0.54 | 0.04 | 0.74 |
| CO | Pre-1978 | 3.45 | 0.10 | 3.95 |
| | 1978 | 3.45 | 0.10 | 3.95 |
| | 1979-1980 | 3.45 | 0.10 | 3.95 |
| | 1981-1983 | 3.45 | 0.10 | 3.95 |
| | 1984+ | 2.33 | 0.04 | 2.53 |
| NOx | Pre-1978 | 1.83 | 0.06 | 2.13 |
| | 1978 | 1.83 | 0.06 | 2.13 |
| | 1979 | 1.83 | 0.06 | 2.13 |
| | 1980 | 1.83 | 0.06 | 2.13 |
| | 1981-1984 | 1.48 | 0.03 | 1.63 |
| | 1985-1986 | 1.48 | 0.03 | 1.63 |
| | 1987+ | 0.94 | 0.03 | 1.09 |

* WHERE : BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

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TABLE 2.6.2A

DATE : MAY 25, 1985

## EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
## LIGHT DUTY DIESEL POWERED TRUCKS
## TOTAL HC

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 3.4 | 1962 | 3.4 | 1963 | 3.4 | 1964 | 3.4 | 1965 | 3.4 | 1966 | 3.4 | 1967 | 3.4 | 1968 | 3.4 | 1969 | 3.4 | 1970 | 3.4 | 1971 | 3.4 | 1972 | 3.4 |
| 1962 | 3.4 | 1963 | 3.4 | 1964 | 3.4 | 1965 | 3.4 | 1966 | 3.4 | 1967 | 3.4 | 1968 | 3.4 | 1969 | 3.4 | 1970 | 3.4 | 1971 | 3.4 | 1972 | 3.4 | 1973 | 3.4 |
| 1963 | 3.4 | 1964 | 3.4 | 1965 | 3.4 | 1966 | 3.4 | 1967 | 3.4 | 1968 | 3.4 | 1969 | 3.4 | 1970 | 3.4 | 1971 | 3.4 | 1972 | 3.4 | 1973 | 3.4 | 1974 | 3.4 |
| 1964 | 3.3 | 1965 | 3.3 | 1966 | 3.3 | 1967 | 3.3 | 1968 | 3.3 | 1969 | 3.3 | 1970 | 3.3 | 1971 | 3.3 | 1972 | 3.3 | 1973 | 3.3 | 1974 | 3.3 | 1975 | 3.3 |
| 1965 | 3.3 | 1966 | 3.3 | 1967 | 3.3 | 1968 | 3.3 | 1969 | 3.3 | 1970 | 3.3 | 1971 | 3.3 | 1972 | 3.3 | 1973 | 3.3 | 1974 | 3.3 | 1975 | 3.3 | 1976 | 3.3 |
| 1966 | 3.2 | 1967 | 3.2 | 1968 | 3.2 | 1969 | 3.2 | 1970 | 3.2 | 1971 | 3.2 | 1972 | 3.2 | 1973 | 3.2 | 1974 | 3.2 | 1975 | 3.2 | 1976 | 3.2 | 1977 | 3.2 |
| 1967 | 3.2 | 1968 | 3.2 | 1969 | 3.2 | 1970 | 3.2 | 1971 | 3.2 | 1972 | 3.2 | 1973 | 3.2 | 1974 | 3.2 | 1975 | 3.2 | 1976 | 3.2 | 1977 | 3.2 | 1978 | 3.2 |
| 1968 | 3.1 | 1969 | 3.1 | 1970 | 3.1 | 1971 | 3.1 | 1972 | 3.1 | 1973 | 3.1 | 1974 | 3.1 | 1975 | 3.1 | 1976 | 3.1 | 1977 | 3.1 | 1978 | 3.1 | 1979 | 3.1 |
| 1969 | 3.0 | 1970 | 3.0 | 1971 | 3.0 | 1972 | 3.0 | 1973 | 3.0 | 1974 | 3.0 | 1975 | 3.0 | 1976 | 3.0 | 1977 | 3.0 | 1978 | 3.0 | 1979 | 3.0 | 1980 | 3.0 |
| 1970 | 3.0 | 1971 | 3.0 | 1972 | 3.0 | 1973 | 3.0 | 1974 | 3.0 | 1975 | 3.0 | 1976 | 3.0 | 1977 | 3.0 | 1978 | 3.0 | 1979 | 3.0 | 1980 | 3.0 | 1981 | 1.5 |
| 1971 | 2.9 | 1972 | 2.9 | 1973 | 2.9 | 1974 | 2.9 | 1975 | 2.9 | 1976 | 2.9 | 1977 | 2.9 | 1978 | 2.9 | 1979 | 2.9 | 1980 | 2.9 | 1981 | 1.5 | 1982 | 1.5 |
| 1972 | 2.8 | 1973 | 2.8 | 1974 | 2.8 | 1975 | 2.8 | 1976 | 2.8 | 1977 | 2.8 | 1978 | 2.8 | 1979 | 2.8 | 1980 | 2.8 | 1981 | 1.4 | 1982 | 1.4 | 1983 | 1.4 |
| 1973 | 2.7 | 1974 | 2.7 | 1975 | 2.7 | 1976 | 2.7 | 1977 | 2.7 | 1978 | 2.7 | 1979 | 2.7 | 1980 | 2.7 | 1981 | 1.4 | 1982 | 1.4 | 1983 | 1.4 | 1984 | 0.9 |
| 1974 | 2.7 | 1975 | 2.7 | 1976 | 2.7 | 1977 | 2.7 | 1978 | 2.7 | 1979 | 2.7 | 1980 | 2.7 | 1981 | 1.3 | 1982 | 1.3 | 1983 | 1.3 | 1984 | 0.9 | 1985 | 0.9 |
| 1975 | 2.6 | 1976 | 2.6 | 1977 | 2.6 | 1978 | 2.6 | 1979 | 2.6 | 1980 | 2.6 | 1981 | 1.3 | 1982 | 1.3 | 1983 | 1.3 | 1984 | 0.8 | 1985 | 0.8 | 1986 | 0.8 |
| 1976 | 2.5 | 1977 | 2.5 | 1978 | 2.5 | 1979 | 2.5 | 1980 | 2.5 | 1981 | 1.2 | 1982 | 1.2 | 1983 | 1.2 | 1984 | 0.8 | 1985 | 0.8 | 1986 | 0.8 | 1987 | 0.8 |
| 1977 | 2.3 | 1978 | 2.3 | 1979 | 2.3 | 1980 | 2.3 | 1981 | 1.2 | 1982 | 1.2 | 1983 | 1.2 | 1984 | 0.7 | 1985 | 0.7 | 1986 | 0.7 | 1987 | 0.7 | 1988 | 0.7 |
| 1978 | 2.2 | 1979 | 2.2 | 1980 | 2.2 | 1981 | 1.1 | 1982 | 1.1 | 1983 | 1.1 | 1984 | 0.7 | 1985 | 0.7 | 1986 | 0.7 | 1987 | 0.7 | 1988 | 0.7 | 1989 | 0.7 |
| 1979 | 2.1 | 1980 | 2.1 | 1981 | 1.0 | 1982 | 1.0 | 1983 | 1.0 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 |
| 1980 | 2.0 | 1981 | 1.0 | 1982 | 1.0 | 1983 | 1.0 | 1984 | 0.5 | 1985 | 0.5 | 1986 | 0.5 | 1987 | 0.5 | 1988 | 0.5 | 1989 | 0.5 | 1990 | 0.5 | 1991 | 0.5 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 3.4 | 1974 | 3.4 | 1975 | 3.4 | 1976 | 3.4 | 1977 | 3.4 | 1978 | 3.4 | 1979 | 3.4 | 1980 | 3.4 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.3 |
| 1974 | 3.4 | 1975 | 3.4 | 1976 | 3.4 | 1977 | 3.4 | 1978 | 3.4 | 1979 | 3.4 | 1980 | 3.4 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.2 | 1985 | 1.2 |
| 1975 | 3.4 | 1976 | 3.4 | 1977 | 3.4 | 1978 | 3.4 | 1979 | 3.4 | 1980 | 3.4 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.2 | 1985 | 1.2 | 1986 | 1.2 |
| 1976 | 3.3 | 1977 | 3.3 | 1978 | 3.3 | 1979 | 3.3 | 1980 | 3.3 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.2 | 1985 | 1.2 | 1986 | 1.2 | 1987 | 1.2 |
| 1977 | 3.3 | 1978 | 3.3 | 1979 | 3.3 | 1980 | 3.3 | 1981 | 1.6 | 1982 | 1.6 | 1983 | 1.6 | 1984 | 1.2 | 1985 | 1.2 | 1986 | 1.2 | 1987 | 1.2 | 1988 | 1.2 |
| 1978 | 3.2 | 1979 | 3.2 | 1980 | 3.2 | 1981 | 1.6 | 1982 | 1.6 | 1983 | 1.6 | 1984 | 1.2 | 1985 | 1.2 | 1986 | 1.2 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 |
| 1979 | 3.2 | 1980 | 3.2 | 1981 | 1.6 | 1982 | 1.6 | 1983 | 1.6 | 1984 | 1.1 | 1985 | 1.1 | 1986 | 1.1 | 1987 | 1.1 | 1988 | 1.1 | 1989 | 1.1 | 1990 | 1.1 |
| 1980 | 3.1 | 1981 | 1.6 | 1982 | 1.6 | 1983 | 1.6 | 1984 | 1.1 | 1985 | 1.1 | 1986 | 1.1 | 1987 | 1.1 | 1988 | 1.1 | 1989 | 1.1 | 1990 | 1.1 | 1991 | 1.1 |
| 1981 | 1.5 | 1982 | 1.5 | 1983 | 1.5 | 1984 | 1.1 | 1985 | 1.1 | 1986 | 1.1 | 1987 | 1.1 | 1988 | 1.1 | 1989 | 1.1 | 1990 | 1.1 | 1991 | 1.1 | 1992 | 1.1 |
| 1982 | 1.5 | 1983 | 1.5 | 1984 | 1.0 | 1985 | 1.0 | 1986 | 1.0 | 1987 | 1.0 | 1988 | 1.0 | 1989 | 1.0 | 1990 | 1.0 | 1991 | 1.0 | 1992 | 1.0 | 1993 | 1.0 |
| 1983 | 1.5 | 1984 | 1.0 | 1985 | 1.0 | 1986 | 1.0 | 1987 | 1.0 | 1988 | 1.0 | 1989 | 1.0 | 1990 | 1.0 | 1991 | 1.0 | 1992 | 1.0 | 1993 | 1.0 | 1994 | 1.0 |
| 1984 | 1.0 | 1985 | 1.0 | 1986 | 1.0 | 1987 | 1.0 | 1988 | 1.0 | 1989 | 1.0 | 1990 | 1.0 | 1991 | 1.0 | 1992 | 1.0 | 1993 | 1.0 | 1994 | 1.0 | 1995 | 1.0 |
| 1985 | 0.9 | 1986 | 0.9 | 1987 | 0.9 | 1988 | 0.9 | 1989 | 0.9 | 1990 | 0.9 | 1991 | 0.9 | 1992 | 0.9 | 1993 | 0.9 | 1994 | 0.9 | 1995 | 0.9 | 1996 | 0.9 |
| 1986 | 0.9 | 1987 | 0.9 | 1988 | 0.9 | 1989 | 0.9 | 1990 | 0.8 | 1991 | 0.9 | 1992 | 0.9 | 1993 | 0.9 | 1994 | 0.9 | 1995 | 0.9 | 1996 | 0.9 | 1997 | 0.9 |
| 1987 | 0.8 | 1988 | 0.8 | 1989 | 0.8 | 1990 | 0.8 | 1991 | 0.8 | 1992 | 0.8 | 1993 | 0.8 | 1994 | 0.8 | 1995 | 0.8 | 1996 | 0.8 | 1997 | 0.8 | 1998 | 0.8 |
| 1988 | 0.8 | 1989 | 0.8 | 1990 | 0.8 | 1991 | 0.8 | 1992 | 0.8 | 1993 | 0.8 | 1994 | 0.8 | 1995 | 0.8 | 1996 | 0.8 | 1997 | 0.8 | 1998 | 0.8 | 1999 | 0.8 |
| 1989 | 0.7 | 1990 | 0.7 | 1991 | 0.7 | 1992 | 0.7 | 1993 | 0.7 | 1994 | 0.7 | 1995 | 0.7 | 1996 | 0.7 | 1997 | 0.7 | 1998 | 0.7 | 1999 | 0.7 | 2000 | 0.7 |
| 1990 | 0.7 | 1991 | 0.7 | 1992 | 0.7 | 1993 | 0.7 | 1994 | 0.7 | 1995 | 0.7 | 1996 | 0.7 | 1997 | 0.7 | 1998 | 0.7 | 1999 | 0.7 | 2000 | 0.7 | 2001 | 0.7 |
| 1991 | 0.6 | 1992 | 0.6 | 1993 | 0.6 | 1994 | 0.6 | 1995 | 0.6 | 1996 | 0.6 | 1997 | 0.6 | 1998 | 0.6 | 1999 | 0.6 | 2000 | 0.6 | 2001 | 0.6 | 2002 | 0.6 |
| 1992 | 0.5 | 1993 | 0.5 | 1994 | 0.5 | 1995 | 0.5 | 1996 | 0.5 | 1997 | 0.5 | 1998 | 0.5 | 1999 | 0.5 | 2000 | 0.5 | 2001 | 0.5 | 2002 | 0.5 | 2003 | 0.5 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.6.4.

TABLE 2.6.2B

DATE : MAY 25, 1985

# EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
# LIGHT DUTY DIESEL POWERED TRUCKS
# CO

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 5.3 | 1962 | 5.3 | 1963 | 5.3 | 1964 | 5.3 | 1965 | 5.3 | 1966 | 5.3 | 1967 | 5.3 | 1968 | 5.3 | 1969 | 5.3 | 1970 | 5.3 | 1971 | 5.3 | 1972 | 5.3 |
| 1962 | 5.2 | 1963 | 5.2 | 1964 | 5.2 | 1965 | 5.2 | 1966 | 5.2 | 1967 | 5.2 | 1968 | 5.2 | 1969 | 5.2 | 1970 | 5.2 | 1971 | 5.2 | 1972 | 5.2 | 1973 | 5.2 |
| 1963 | 5.2 | 1964 | 5.2 | 1965 | 5.2 | 1966 | 5.2 | 1967 | 5.2 | 1968 | 5.2 | 1969 | 5.2 | 1970 | 5.2 | 1971 | 5.2 | 1972 | 5.2 | 1973 | 5.2 | 1974 | 5.2 |
| 1964 | 5.1 | 1965 | 5.1 | 1966 | 5.1 | 1967 | 5.1 | 1968 | 5.1 | 1969 | 5.1 | 1970 | 5.1 | 1971 | 5.1 | 1972 | 5.1 | 1973 | 5.1 | 1974 | 5.1 | 1975 | 5.1 |
| 1965 | 5.1 | 1966 | 5.1 | 1967 | 5.1 | 1968 | 5.1 | 1969 | 5.1 | 1970 | 5.1 | 1971 | 5.1 | 1972 | 5.1 | 1973 | 5.1 | 1974 | 5.1 | 1975 | 5.1 | 1976 | 5.1 |
| 1966 | 5.0 | 1967 | 5.0 | 1968 | 5.0 | 1969 | 5.0 | 1970 | 5.0 | 1971 | 5.0 | 1972 | 5.0 | 1973 | 5.0 | 1974 | 5.0 | 1975 | 5.0 | 1976 | 5.0 | 1977 | 5.0 |
| 1967 | 4.9 | 1968 | 4.9 | 1969 | 4.9 | 1970 | 4.9 | 1971 | 4.9 | 1972 | 4.9 | 1973 | 4.9 | 1974 | 4.9 | 1975 | 4.9 | 1976 | 4.9 | 1977 | 4.9 | 1978 | 4.9 |
| 1968 | 4.9 | 1969 | 4.9 | 1970 | 4.9 | 1971 | 4.9 | 1972 | 4.9 | 1973 | 4.9 | 1974 | 4.9 | 1975 | 4.9 | 1976 | 4.9 | 1977 | 4.9 | 1978 | 4.9 | 1979 | 4.9 |
| 1969 | 4.8 | 1970 | 4.8 | 1971 | 4.8 | 1972 | 4.8 | 1973 | 4.8 | 1974 | 4.8 | 1975 | 4.8 | 1976 | 4.8 | 1977 | 4.8 | 1978 | 4.8 | 1979 | 4.8 | 1980 | 4.8 |
| 1970 | 4.7 | 1971 | 4.7 | 1972 | 4.7 | 1973 | 4.7 | 1974 | 4.7 | 1975 | 4.7 | 1976 | 4.7 | 1977 | 4.7 | 1978 | 4.7 | 1979 | 4.7 | 1980 | 4.7 | 1981 | 4.7 |
| 1971 | 4.6 | 1972 | 4.6 | 1973 | 4.6 | 1974 | 4.6 | 1975 | 4.6 | 1976 | 4.6 | 1977 | 4.6 | 1978 | 4.6 | 1979 | 4.6 | 1980 | 4.6 | 1981 | 4.6 | 1982 | 4.6 |
| 1972 | 4.5 | 1973 | 4.5 | 1974 | 4.5 | 1975 | 4.5 | 1976 | 4.5 | 1977 | 4.5 | 1978 | 4.5 | 1979 | 4.5 | 1980 | 4.5 | 1981 | 4.5 | 1982 | 4.5 | 1983 | 4.5 |
| 1973 | 4.4 | 1974 | 4.4 | 1975 | 4.4 | 1976 | 4.4 | 1977 | 4.4 | 1978 | 4.4 | 1979 | 4.4 | 1980 | 4.4 | 1981 | 4.4 | 1982 | 4.4 | 1983 | 4.4 | 1984 | 2.7 |
| 1974 | 4.3 | 1975 | 4.3 | 1976 | 4.3 | 1977 | 4.3 | 1978 | 4.3 | 1979 | 4.3 | 1980 | 4.3 | 1981 | 4.3 | 1982 | 4.3 | 1983 | 4.3 | 1984 | 2.7 | 1985 | 2.7 |
| 1975 | 4.2 | 1976 | 4.2 | 1977 | 4.2 | 1978 | 4.2 | 1979 | 4.2 | 1980 | 4.2 | 1981 | 4.2 | 1982 | 4.2 | 1983 | 4.2 | 1984 | 2.6 | 1985 | 2.6 | 1986 | 2.6 |
| 1976 | 4.0 | 1977 | 4.0 | 1978 | 4.0 | 1979 | 4.0 | 1980 | 4.0 | 1981 | 4.0 | 1982 | 4.0 | 1983 | 4.0 | 1984 | 2.6 | 1985 | 2.6 | 1986 | 2.6 | 1987 | 2.6 |
| 1977 | 3.9 | 1978 | 3.9 | 1979 | 3.9 | 1980 | 3.9 | 1981 | 3.9 | 1982 | 3.9 | 1983 | 3.9 | 1984 | 2.5 | 1985 | 2.5 | 1986 | 2.5 | 1987 | 2.5 | 1988 | 2.5 |
| 1978 | 3.8 | 1979 | 3.8 | 1980 | 3.8 | 1981 | 3.8 | 1982 | 3.8 | 1983 | 3.8 | 1984 | 2.5 | 1985 | 2.5 | 1986 | 2.5 | 1987 | 2.5 | 1988 | 2.5 | 1989 | 2.5 |
| 1979 | 3.6 | 1980 | 3.6 | 1981 | 3.6 | 1982 | 3.6 | 1983 | 3.6 | 1984 | 2.4 | 1985 | 2.4 | 1986 | 2.4 | 1987 | 2.4 | 1988 | 2.4 | 1989 | 2.4 | 1990 | 2.4 |
| 1980 | 3.5 | 1981 | 3.5 | 1982 | 3.5 | 1983 | 3.5 | 1984 | 2.3 | 1985 | 2.3 | 1986 | 2.3 | 1987 | 2.3 | 1988 | 2.3 | 1989 | 2.3 | 1990 | 2.3 | 1991 | 2.3 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 5.3 | 1974 | 5.3 | 1975 | 5.3 | 1976 | 5.3 | 1977 | 5.3 | 1978 | 5.3 | 1979 | 5.3 | 1980 | 5.3 | 1981 | 5.3 | 1982 | 5.3 | 1983 | 5.3 | 1984 | 3.1 |
| 1974 | 5.2 | 1975 | 5.2 | 1976 | 5.2 | 1977 | 5.2 | 1978 | 5.2 | 1979 | 5.2 | 1980 | 5.2 | 1981 | 5.2 | 1982 | 5.2 | 1983 | 5.2 | 1984 | 3.0 | 1985 | 3.0 |
| 1975 | 5.2 | 1976 | 5.2 | 1977 | 5.2 | 1978 | 5.2 | 1979 | 5.2 | 1980 | 5.2 | 1981 | 5.2 | 1982 | 5.2 | 1983 | 5.2 | 1984 | 3.0 | 1985 | 3.0 | 1986 | 3.0 |
| 1976 | 5.1 | 1977 | 5.1 | 1978 | 5.1 | 1979 | 5.1 | 1980 | 5.1 | 1981 | 5.1 | 1982 | 5.1 | 1983 | 5.1 | 1984 | 3.0 | 1985 | 3.0 | 1986 | 3.0 | 1987 | 3.0 |
| 1977 | 5.1 | 1978 | 5.1 | 1979 | 5.1 | 1980 | 5.1 | 1981 | 5.1 | 1982 | 5.1 | 1983 | 5.1 | 1984 | 3.0 | 1985 | 3.0 | 1986 | 3.0 | 1987 | 3.0 | 1988 | 3.0 |
| 1978 | 5.0 | 1979 | 5.0 | 1980 | 5.0 | 1981 | 5.0 | 1982 | 5.0 | 1983 | 5.0 | 1984 | 3.0 | 1985 | 3.0 | 1986 | 3.0 | 1987 | 3.0 | 1988 | 3.0 | 1989 | 3.0 |
| 1979 | 4.9 | 1980 | 4.9 | 1981 | 4.9 | 1982 | 4.9 | 1983 | 4.9 | 1984 | 2.9 | 1985 | 2.9 | 1986 | 2.9 | 1987 | 2.9 | 1988 | 2.9 | 1989 | 2.9 | 1990 | 2.9 |
| 1980 | 4.9 | 1981 | 4.9 | 1982 | 4.9 | 1983 | 4.9 | 1984 | 2.9 | 1985 | 2.9 | 1986 | 2.9 | 1987 | 2.9 | 1988 | 2.9 | 1989 | 2.9 | 1990 | 2.9 | 1991 | 2.9 |
| 1981 | 4.8 | 1982 | 4.8 | 1983 | 4.8 | 1984 | 2.9 | 1985 | 2.9 | 1986 | 2.9 | 1987 | 2.9 | 1988 | 2.9 | 1989 | 2.9 | 1990 | 2.9 | 1991 | 2.9 | 1992 | 2.9 |
| 1982 | 4.7 | 1983 | 4.7 | 1984 | 2.8 | 1985 | 2.8 | 1986 | 2.8 | 1987 | 2.8 | 1988 | 2.8 | 1989 | 2.8 | 1990 | 2.8 | 1991 | 2.8 | 1992 | 2.8 | 1993 | 2.8 |
| 1983 | 4.6 | 1984 | 2.8 | 1985 | 2.8 | 1986 | 2.8 | 1987 | 2.8 | 1988 | 2.8 | 1989 | 2.8 | 1990 | 2.8 | 1991 | 2.8 | 1992 | 2.8 | 1993 | 2.8 | 1994 | 2.8 |
| 1984 | 2.8 | 1985 | 2.8 | 1986 | 2.8 | 1987 | 2.8 | 1988 | 2.8 | 1989 | 2.8 | 1990 | 2.8 | 1991 | 2.8 | 1992 | 2.8 | 1993 | 2.8 | 1994 | 2.8 | 1995 | 2.8 |
| 1985 | 2.7 | 1986 | 2.7 | 1987 | 2.7 | 1988 | 2.7 | 1989 | 2.7 | 1990 | 2.7 | 1991 | 2.7 | 1992 | 2.7 | 1993 | 2.7 | 1994 | 2.7 | 1995 | 2.7 | 1996 | 2.7 |
| 1986 | 2.7 | 1987 | 2.7 | 1988 | 2.7 | 1989 | 2.7 | 1990 | 2.7 | 1991 | 2.7 | 1992 | 2.7 | 1993 | 2.7 | 1994 | 2.7 | 1995 | 2.7 | 1996 | 2.7 | 1997 | 2.7 |
| 1987 | 2.6 | 1988 | 2.6 | 1989 | 2.6 | 1990 | 2.6 | 1991 | 2.6 | 1992 | 2.6 | 1993 | 2.6 | 1994 | 2.6 | 1995 | 2.6 | 1996 | 2.6 | 1997 | 2.6 | 1998 | 2.6 |
| 1988 | 2.6 | 1989 | 2.6 | 1990 | 2.6 | 1991 | 2.6 | 1992 | 2.6 | 1993 | 2.6 | 1994 | 2.6 | 1995 | 2.6 | 1996 | 2.6 | 1997 | 2.6 | 1998 | 2.6 | 1999 | 2.6 |
| 1989 | 2.5 | 1990 | 2.5 | 1991 | 2.5 | 1992 | 2.5 | 1993 | 2.5 | 1994 | 2.5 | 1995 | 2.5 | 1996 | 2.5 | 1997 | 2.5 | 1998 | 2.5 | 1999 | 2.5 | 2000 | 2.5 |
| 1990 | 2.5 | 1991 | 2.5 | 1992 | 2.5 | 1993 | 2.5 | 1994 | 2.5 | 1995 | 2.5 | 1996 | 2.5 | 1997 | 2.5 | 1998 | 2.5 | 1999 | 2.5 | 2000 | 2.5 | 2001 | 2.5 |
| 1991 | 2.4 | 1992 | 2.4 | 1993 | 2.4 | 1994 | 2.4 | 1995 | 2.4 | 1996 | 2.4 | 1997 | 2.4 | 1998 | 2.4 | 1999 | 2.4 | 2000 | 2.4 | 2001 | 2.4 | 2002 | 2.4 |
| 1992 | 2.3 | 1993 | 2.3 | 1994 | 2.3 | 1995 | 2.3 | 1996 | 2.3 | 1997 | 2.3 | 1998 | 2.3 | 1999 | 2.3 | 2000 | 2.3 | 2001 | 2.3 | 2002 | 2.3 | 2003 | 2.3 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.6.4.

TABLE 2.6.2C

DATE : MAY 25, 1985

## EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE LIGHT DUTY DIESEL POWERED TRUCKS NOx

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 2.9 | 1962 | 2.9 | 1963 | 2.9 | 1964 | 2.9 | 1965 | 2.9 | 1966 | 2.9 | 1967 | 2.9 | 1968 | 2.9 | 1969 | 2.9 | 1970 | 2.9 | 1971 | 2.9 | 1972 | 2.9 |
| 1962 | 2.9 | 1963 | 2.9 | 1964 | 2.9 | 1965 | 2.9 | 1966 | 2.9 | 1967 | 2.9 | 1968 | 2.9 | 1969 | 2.9 | 1970 | 2.9 | 1971 | 2.9 | 1972 | 2.9 | 1973 | 2.9 |
| 1963 | 2.9 | 1964 | 2.9 | 1965 | 2.9 | 1966 | 2.9 | 1967 | 2.9 | 1968 | 2.9 | 1969 | 2.9 | 1970 | 2.9 | 1971 | 2.9 | 1972 | 2.9 | 1973 | 2.9 | 1974 | 2.9 |
| 1964 | 2.8 | 1965 | 2.8 | 1966 | 2.8 | 1967 | 2.8 | 1968 | 2.8 | 1969 | 2.8 | 1970 | 2.8 | 1971 | 2.8 | 1972 | 2.8 | 1973 | 2.8 | 1974 | 2.8 | 1975 | 2.8 |
| 1965 | 2.8 | 1966 | 2.8 | 1967 | 2.8 | 1968 | 2.8 | 1969 | 2.8 | 1970 | 2.8 | 1971 | 2.8 | 1972 | 2.8 | 1973 | 2.8 | 1974 | 2.8 | 1975 | 2.8 | 1976 | 2.8 |
| 1966 | 2.8 | 1967 | 2.8 | 1968 | 2.8 | 1969 | 2.8 | 1970 | 2.8 | 1971 | 2.8 | 1972 | 2.8 | 1973 | 2.8 | 1974 | 2.8 | 1975 | 2.8 | 1976 | 2.8 | 1977 | 2.8 |
| 1967 | 2.7 | 1968 | 2.7 | 1969 | 2.7 | 1970 | 2.7 | 1971 | 2.7 | 1972 | 2.7 | 1973 | 2.7 | 1974 | 2.7 | 1975 | 2.7 | 1976 | 2.7 | 1977 | 2.7 | 1978 | 2.7 |
| 1968 | 2.7 | 1969 | 2.7 | 1970 | 2.7 | 1971 | 2.7 | 1972 | 2.7 | 1973 | 2.7 | 1974 | 2.7 | 1975 | 2.7 | 1976 | 2.7 | 1977 | 2.7 | 1978 | 2.7 | 1979 | 2.7 |
| 1969 | 2.6 | 1970 | 2.6 | 1971 | 2.6 | 1972 | 2.6 | 1973 | 2.6 | 1974 | 2.6 | 1975 | 2.6 | 1976 | 2.6 | 1977 | 2.6 | 1978 | 2.6 | 1979 | 2.6 | 1980 | 2.6 |
| 1970 | 2.6 | 1971 | 2.6 | 1972 | 2.6 | 1973 | 2.6 | 1974 | 2.6 | 1975 | 2.6 | 1976 | 2.6 | 1977 | 2.6 | 1978 | 2.6 | 1979 | 2.6 | 1980 | 2.6 | 1981 | 1.9 |
| 1971 | 2.5 | 1972 | 2.5 | 1973 | 2.5 | 1974 | 2.5 | 1975 | 2.5 | 1976 | 2.5 | 1977 | 2.5 | 1978 | 2.5 | 1979 | 2.5 | 1980 | 2.5 | 1981 | 1.8 | 1982 | 1.8 |
| 1972 | 2.5 | 1973 | 2.5 | 1974 | 2.5 | 1975 | 2.5 | 1976 | 2.5 | 1977 | 2.5 | 1978 | 2.5 | 1979 | 2.5 | 1980 | 2.5 | 1981 | 1.8 | 1982 | 1.8 | 1983 | 1.8 |
| 1973 | 2.4 | 1974 | 2.4 | 1975 | 2.4 | 1976 | 2.4 | 1977 | 2.4 | 1978 | 2.4 | 1979 | 2.4 | 1980 | 2.4 | 1981 | 1.8 | 1982 | 1.8 | 1983 | 1.8 | 1984 | 1.8 |
| 1974 | 2.3 | 1975 | 2.3 | 1976 | 2.3 | 1977 | 2.3 | 1978 | 2.3 | 1979 | 2.3 | 1980 | 2.3 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.7 | 1985 | 1.7 |
| 1975 | 2.3 | 1976 | 2.3 | 1977 | 2.3 | 1978 | 2.3 | 1979 | 2.3 | 1980 | 2.3 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.7 | 1985 | 1.7 | 1986 | 1.7 |
| 1976 | 2.2 | 1977 | 2.2 | 1978 | 2.2 | 1979 | 2.2 | 1980 | 2.2 | 1981 | 1.7 | 1982 | 1.7 | 1983 | 1.7 | 1984 | 1.7 | 1985 | 1.7 | 1986 | 1.7 | 1987 | 1.1 |
| 1977 | 2.1 | 1978 | 2.1 | 1979 | 2.1 | 1980 | 2.1 | 1981 | 1.6 | 1982 | 1.6 | 1983 | 1.6 | 1984 | 1.6 | 1985 | 1.6 | 1986 | 1.6 | 1987 | 1.1 | 1988 | 1.1 |
| 1978 | 2.0 | 1979 | 2.0 | 1980 | 2.0 | 1981 | 1.6 | 1382 | 1.6 | 1983 | 1.6 | 1984 | 1.6 | 1985 | 1.6 | 1986 | 1.6 | 1987 | 1.0 | 1988 | 1.0 | 1989 | 1.0 |
| 1979 | 1.9 | 1980 | 1.9 | 1981 | 1.5 | 1982 | 1.5 | 1983 | 1.5 | 1984 | 1.5 | 1985 | 1.5 | 1986 | 1.5 | 1987 | 1.0 | 1988 | 1.0 | 1989 | 1.0 | 1990 | 1.0 |
| 1980 | 1.8 | 1981 | 1.5 | 1982 | 1.5 | 1983 | 1.5 | 1984 | 1.5 | 1985 | 1.5 | 1986 | 1.5 | 1987 | 0.9 | 1988 | 0.9 | 1989 | 0.9 | 1990 | 0.9 | 1991 | 0.9 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 2.9 | 1974 | 2.9 | 1975 | 2.9 | 1976 | 2.9 | 1977 | 2.9 | 1978 | 2.9 | 1979 | 2.9 | 1980 | 2.9 | 1981 | 2.0 | 1982 | 2.0 | 1983 | 2.0 | 1984 | 2.0 |
| 1974 | 2.9 | 1975 | 2.9 | 1976 | 2.9 | 1977 | 2.9 | 1978 | 2.9 | 1979 | 2.9 | 1980 | 2.9 | 1981 | 2.0 | 1982 | 2.0 | 1983 | 2.0 | 1984 | 2.0 | 1985 | 2.0 |
| 1975 | 2.9 | 1976 | 2.9 | 1977 | 2.9 | 1978 | 2.9 | 1979 | 2.9 | 1980 | 2.9 | 1981 | 2.0 | 1982 | 2.0 | 1983 | 2.0 | 1984 | 2.0 | 1985 | 2.0 | 1986 | 2.0 |
| 1976 | 2.8 | 1977 | 2.8 | 1978 | 2.8 | 1979 | 2.8 | 1980 | 2.8 | 1981 | 2.0 | 1982 | 2.0 | 1983 | 2.0 | 1984 | 2.0 | 1985 | 2.0 | 1986 | 2.0 | 1987 | 1.4 |
| 1977 | 2.8 | 1978 | 2.8 | 1979 | 2.8 | 1980 | 2.8 | 1981 | 2.0 | 1982 | 2.0 | 1983 | 2.0 | 1984 | 2.0 | 1985 | 2.0 | 1986 | 2.0 | 1987 | 1.4 | 1988 | 1.4 |
| 1978 | 2.8 | 1979 | 2.8 | 1980 | 2.8 | 1981 | 2.0 | 1982 | 2.0 | 1983 | 2.0 | 1984 | 2.0 | 1985 | 2.0 | 1986 | 2.0 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 |
| 1979 | 2.7 | 1980 | 2.7 | 1981 | 1.9 | 1982 | 1.9 | 1983 | 1.9 | 1984 | 1.9 | 1985 | 1.9 | 1986 | 1.9 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 |
| 1980 | 2.7 | 1981 | 1.9 | 1982 | 1.9 | 1983 | 1.9 | 1984 | 1.9 | 1985 | 1.9 | 1986 | 1.9 | 1987 | 1.4 | 1988 | 1.4 | 1989 | 1.4 | 1990 | 1.4 | 1991 | 1.4 |
| 1981 | 1.9 | 1982 | 1.9 | 1983 | 1.9 | 1984 | 1.9 | 1985 | 1.9 | 1986 | 1.9 | 1987 | 1.3 | 1988 | 1.3 | 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 |
| 1982 | 1.9 | 1983 | 1.9 | 1984 | 1.9 | 1985 | 1.9 | 1986 | 1.9 | 1987 | 1.3 | 1988 | 1.3 | 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 | 1993 | 1.3 |
| 1983 | 1.8 | 1984 | 1.8 | 1985 | 1.8 | 1986 | 1.8 | 1987 | 1.3 | 1988 | 1.3 | 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 | 1993 | 1.3 | 1994 | 1.3 |
| 1984 | 1.8 | 1985 | 1.8 | 1986 | 1.8 | 1987 | 1.3 | 1988 | 1.3 | 1989 | 1.3 | 1990 | 1.3 | 1991 | 1.3 | 1992 | 1.3 | 1993 | 1.3 | 1994 | 1.3 | 1995 | 1.3 |
| 1985 | 1.8 | 1986 | 1.8 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 | 1991 | 1.2 | 1992 | 1.2 | 1993 | 1.2 | 1994 | 1.2 | 1995 | 1.2 | 1996 | 1.2 |
| 1986 | 1.7 | 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 | 1991 | 1.2 | 1992 | 1.2 | 1993 | 1.2 | 1994 | 1.2 | 1995 | 1.2 | 1996 | 1.2 | 1997 | 1.2 |
| 1987 | 1.2 | 1988 | 1.2 | 1989 | 1.2 | 1990 | 1.2 | 1991 | 1.2 | 1992 | 1.2 | 1993 | 1.2 | 1994 | 1.2 | 1995 | 1.2 | 1996 | 1.2 | 1997 | 1.2 | 1998 | 1.2 |
| 1988 | 1.1 | 1989 | 1.1 | 1990 | 1.1 | 1991 | 1.1 | 1992 | 1.1 | 1993 | 1.1 | 1994 | 1.1 | 1995 | 1.1 | 1996 | 1.1 | 1997 | 1.1 | 1998 | 1.1 | 1999 | 1.1 |
| 1989 | 1.1 | 1990 | 1.1 | 1991 | 1.1 | 1992 | 1.1 | 1993 | 1.1 | 1994 | 1.1 | 1995 | 1.1 | 1996 | 1.1 | 1997 | 1.1 | 1998 | 1.1 | 1999 | 1.1 | 2000 | 1.1 |
| 1990 | 1.0 | 1991 | 1.0 | 1992 | 1.0 | 1993 | 1.0 | 1994 | 1.0 | 1995 | 1.0 | 1996 | 1.0 | 1997 | 1.0 | 1998 | 1.0 | 1999 | 1.0 | 2000 | 1.0 | 2001 | 1.0 |
| 1991 | 1.0 | 1992 | 1.0 | 1993 | 1.0 | 1994 | 1.0 | 1995 | 1.0 | 1996 | 1.0 | 1997 | 1.0 | 1998 | 1.0 | 1999 | 1.0 | 2000 | 1.0 | 2001 | 1.0 | 2002 | 1.0 |
| 1992 | 0.9 | 1993 | 0.3 | 1994 | 0.9 | 1995 | 0.9 | 1996 | 0.9 | 1997 | 0.9 | 1998 | 0.9 | 1999 | 0.9 | 2000 | 0.9 | 2001 | 0.9 | 2002 | 0.9 | 2003 | 0.9 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.6.4.

## TABLE 2.6.3

## IDLE EMISSION RATES FOR HIGH ALTITUDE LIGHT DUTY DIESEL POWERED TRUCKS

* IER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Min.) | Deterioration Rate (Gm/Min/10K Mi) |
|---|---|---|---|
| HC | Pre-1978 | 0.18 | 0.01 |
| | 1978 | 0.23 | 0.01 |
| | 1979-1980 | 0.23 | 0.01 |
| | 1981-1983 | 0.07 | 0.0 |
| | 1984+ | 0.07 | 0.0 |
| CO | Pre-1978 | 0.53 | 0.02 |
| | 1978 | 0.54 | 0.01 |
| | 1979-1980 | 0.54 | 0.01 |
| | 1981-1983 | 0.54 | 0.0 |
| | 1984+ | 0.31 | 0.0 |
| NOx | Pre-1978 | 0.19 | 0.01 |
| | 1978 | 0.32 | 0.01 |
| | 1979 | 0.32 | 0.01 |
| | 1980 | 0.32 | 0.01 |
| | 1981-1984 | 0.34 | 0.0 |
| | 1985-1986 | 0.34 | 0.0 |
| | 1987+ | 0.13 | 0.0 |

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

DATE : MAY 25, 1985

## TABLE 2.6.4

## REGISTRATION MIX AND MILEAGE ACCUMULATION RATES FOR HIGH ALTITUDE LIGHT DUTY DIESEL POWERED TRUCKS

| Model Year Index** | July 1 Registration Mix* | Mileage Accumulation Rate per truck * | Jan 1 Registration Mix | Jan 1 Mileage Accumulation Rate (fleet) | Jan 1 Mileage Accumulation (fleet) |
|---|---|---|---|---|---|
| 1 | 0.067 | 17552. | 0.022 | 17552. | 2194. |
| 2 | 0.085 | 16262. | 0.085 | 17229. | 13124. |
| 3 | 0.081 | 15068. | 0.081 | 15963. | 29711. |
| 4 | 0.077 | 13961. | 0.077 | 14791. | 45080. |
| 5 | 0.073 | 12936. | 0.073 | 13705. | 59321. |
| 6 | 0.069 | 11986. | 0.069 | 12698. | 72515. |
| 7 | 0.065 | 11105. | 0.065 | 11766. | 84741. |
| 8 | 0.061 | 10290. | 0.061 | 10901. | 96068. |
| 9 | 0.057 | 9534. | 0.057 | 10101. | 106564. |
| 10 | 0.053 | 8833. | 0.053 | 9359. | 116288. |
| 11 | 0.048 | 8185. | 0.048 | 8671. | 125298. |
| 12 | 0.044 | 7583. | 0.044 | 8034. | 133646. |
| 13 | 0.040 | 7026. | 0.040 | 7444. | 141381. |
| 14 | 0.036 | 6510. | 0.036 | 6897. | 148548. |
| 15 | 0.032 | 6032. | 0.032 | 6390. | 155188. |
| 16 | 0.028 | 5589. | 0.028 | 5921. | 161340. |
| 17 | 0.024 | 5179. | 0.024 | 5486. | 167041. |
| 18 | 0.020 | 4798. | 0.020 | 5084. | 172323. |
| 19 | 0.016 | 4446. | 0.016 | 4710. | 177217. |
| 20+ | 0.024 | 4119. | 0.024 | 4364. | 181752. |

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

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### TABLE 2.6.5

### EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR HIGH ALTITUDE LIGHT DUTY DIESEL POWERED TRUCKS JANUARY 1, 1988

| Model Years | (A) LDT1 Fleet Registration | (B) Sales Fraction | (A*B) | (C=A*B/DAF) LDDT Registration | (D) Annual Mileage Accrual Rate | (C*D) | (C*D/TFNORM) Travel Fractions |
|---|---|---|---|---|---|---|---|
| 1988 | 0.022 | 0.240 | 0.005 | 0.067 | 17552. | 1181.5 | 0.080 |
| 1987 | 0.085 | 0.210 | 0.018 | 0.224 | 17229. | 3862.4 | 0.262 |
| 1986 | 0.081 | 0.180 | 0.015 | 0.183 | 15963. | 2923.0 | 0.198 |
| 1985 | 0.077 | 0.160 | 0.012 | 0.155 | 14791. | 2288.6 | 0.155 |
| 1984 | 0.073 | 0.130 | 0.009 | 0.119 | 13705. | 1633.4 | 0.111 |
| 1983 | 0.069 | 0.100 | 0.007 | 0.087 | 12698. | 1100.4 | 0.075 |
| 1982 | 0.065 | 0.080 | 0.005 | 0.065 | 11766. | 768.4 | 0.052 |
| 1981 | 0.061 | 0.060 | 0.004 | 0.046 | 10901. | 501.1 | 0.034 |
| 1980 | 0.057 | 0.034 | 0.002 | 0.024 | 10101. | 245.8 | 0.017 |
| 1979 | 0.053 | 0.028 | 0.001 | 0.019 | 9359. | 174.4 | 0.012 |
| 1978 | 0.048 | 0.009 | 0.000 | 0.005 | 8671. | 47.0 | 0.003 |
| 1977 | 0.044 | 0.005 | 0.000 | 0.003 | 8034. | 22.2 | 0.002 |
| 1976 | 0.040 | 0.003 | 0.000 | 0.002 | 7444. | 11.2 | 0.001 |
| 1975 | 0.036 | 0.002 | 0.000 | 0.001 | 6897. | 6.2 | 0.000 |
| 1974 | 0.032 | 0.0 | 0.0 | 0.0 | 6390. | 0.0 | 0.0 |
| 1973 | 0.028 | 0.0 | 0.0 | 0.0 | 5921. | 0.0 | 0.0 |
| 1972 | 0.024 | 0.0 | 0.0 | 0.0 | 5486. | 0.0 | 0.0 |
| 1971 | 0.020 | 0.0 | 0.0 | 0.0 | 5084. | 0.0 | 0.0 |
| 1970 | 0.016 | 0.0 | 0.0 | 0.0 | 4710. | 0.0 | 0.0 |
| 1969- | 0.024 | 0.0 | 0.0 | 0.0 | 4364. | 0.0 | 0.0 |
|  |  | DAF: | 0.080 |  | TFNORM: | 14765.6 |  |

WHERE :

A = January 1 registration mix from Table 2.6.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 2.6.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI) = .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

NOTE : In general, the travel weighting fractions will change for every calendar year since the sales fraction (column B) changes for almost every model year.

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## TABLE 2.6.6

## SPEED CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE LIGHT DUTY DIESEL POWERED TRUCKS

$$* \ SCF(s,sadj) = SF(s)/SF(sadj)$$

$$SF(s) = EXP(A + B*s + C*s^2)$$

| Pol | Model Years | Coefficients A | B | C |
|---|---|---|---|---|
| HC | All | 0.90900 | -0.05500 | 0.00044 |
| CO | All | 1.37520 | -0.08800 | 0.00091 |
| NOx | All | 0.66800 | -0.04800 | 0.00071 |

* WHERE :

s = average speed (mph)

sadj = basic test procedure speed; adjusted for fraction of cold start operation x and fraction of hot start operation w,
[ $1/sadj = (w+x)/26 + (1-w-x)/16$ ]

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## TABLE 2.6.7

## NORMALIZED BAG FRACTIONS FOR HIGH ALTITUDE LIGHT DUTY DIESEL POWERED TRUCKS

| | | Normalized Fractions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Model | Test Seg.#1 | | Test Seg.#2 | | Test Seg.#3 | | Total Test | |
| Pol | Years | B1 | D1 | B2 | D2 | B3 | D3 | B0 | D0 |
| HC | Pre-1979 | 1.209 | 0.112 | 1.073 | 0.091 | 0.703 | 0.093 | 1.000 | 0.096 |
| | 1979 | 1.209 | 0.110 | 1.073 | 0.089 | 0.703 | 0.092 | 1.000 | 0.094 |
| | 1980-1982 | 1.209 | 0.110 | 1.073 | 0.089 | 0.703 | 0.092 | 1.000 | 0.094 |
| | 1983+ | 1.209 | 0.115 | 1.073 | 0.093 | 0.703 | 0.095 | 1.000 | 0.098 |
| CO | Pre-1979 | 1.199 | 0.062 | 0.935 | 0.044 | 0.974 | 0.053 | 1.000 | 0.050 |
| | 1979 | 1.199 | 0.060 | 0.935 | 0.043 | 0.974 | 0.051 | 1.000 | 0.049 |
| | 1980-1982 | 1.199 | 0.057 | 0.935 | 0.040 | 0.974 | 0.048 | 1.000 | 0.046 |
| | 1983+ | 1.199 | 0.057 | 0.935 | 0.040 | 0.974 | 0.048 | 1.000 | 0.046 |
| NOx | Pre-1979 | 1.068 | 0.033 | 0.981 | 0.036 | 0.985 | 0.032 | 1.000 | 0.034 |
| | 1979 | 1.068 | 0.033 | 0.981 | 0.035 | 0.985 | 0.032 | 1.000 | 0.034 |
| | 1980-1984 | 1.068 | 0.036 | 0.981 | 0.038 | 0.985 | 0.035 | 1.000 | 0.037 |
| | 1985+ | 1.068 | 0.071 | 0.981 | 0.072 | 0.985 | 0.068 | 1.000 | 0.071 |

NOTE : The fractions given in this table are used in the calculation of the operating-mode/ temperature correction factor (OMTCF).

WHERE : OMTCF = ((TERM1 + TERM2 + TERM3)/DENOM)
TERM1 = W *TCF(1)*(B1+D1*M)
TERM2 = (1-W-X)*TCF(2)*(B2+D2*M)
TERM3 = X *TCF(3)*(B3+D3*M)
DENOM = B0 + D0*M
W = Fraction of VMT in the cold start mode
X = Fraction of VMT in the hot start mode
TCF(b) = Temperature correction factor for pollutant, model year; for test segment b
M = Cumulative mileage / 10,000

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## TABLE 2.7.1

## EXHAUST EMISSION RATES FOR HIGH ALTITUDE HEAVY DUTY DIESEL POWERED VEHICLES (RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Mile) | Deterioration Rate (Gm/Mi/10K Mi) | 50,000 Mile Emission Level (Grams/Mile) |
|---|---|---|---|---|
| HC | Pre-1963 | 7.76 | 0.05 | 8.01 |
| | 1963-1965 | 7.73 | 0.05 | 7.98 |
| | 1966-1968 | 8.00 | 0.06 | 8.30 |
| | 1969-1971 | 8.51 | 0.06 | 8.81 |
| | 1972-1974 | 9.03 | 0.06 | 9.33 |
| | 1975-1979 | 8.95 | 0.06 | 9.25 |
| | 1980-1981 | 8.11 | 0.06 | 8.41 |
| | 1982-1984 | 7.47 | 0.05 | 7.72 |
| | 1985 | 7.16 | 0.02 | 7.26 |
| | 1986 | 5.75 | 0.02 | 5.85 |
| | 1987-1992 | 5.59 | 0.02 | 5.69 |
| | 1993-1996 | 5.49 | 0.02 | 5.59 |
| | 1997+ | 5.44 | 0.02 | 5.54 |
| CO | Pre-1963 | 17.22 | 0.14 | 17.92 |
| | 1963-1965 | 17.15 | 0.14 | 17.85 |
| | 1966-1968 | 17.75 | 0.14 | 18.45 |
| | 1969-1971 | 18.89 | 0.15 | 19.64 |
| | 1972-1974 | 20.04 | 0.16 | 20.84 |
| | 1975-1979 | 19.56 | 0.16 | 20.36 |
| | 1980-1981 | 16.64 | 0.14 | 17.34 |
| | 1982-1984 | 15.32 | 0.13 | 15.97 |
| | 1985 | 14.80 | 0.12 | 15.40 |
| | 1986 | 14.53 | 0.12 | 15.13 |
| | 1987-1992 | 14.14 | 0.12 | 14.74 |
| | 1993-1996 | 13.88 | 0.12 | 14.48 |
| | 1997+ | 13.76 | 0.11 | 14.31 |
| NOx | Pre-1963 | 21.94 | 0.0 | 21.94 |
| | 1963-1965 | 21.85 | 0.0 | 21.85 |
| | 1966-1968 | 22.61 | 0.0 | 22.61 |
| | 1969-1971 | 24.06 | 0.0 | 24.06 |
| | 1972-1974 | 25.53 | 0.0 | 25.53 |
| | 1975-1979 | 24.77 | 0.0 | 24.77 |
| | 1980-1981 | 20.50 | 0.0 | 20.50 |
| | 1982-1984 | 18.88 | 0.0 | 18.88 |
| | 1985 | 18.23 | 0.0 | 18.23 |
| | 1986 | 17.90 | 0.0 | 17.90 |
| | 1987-1992 | 11.19 | 0.05 | 11.44 |
| | 1993-1996 | 10.98 | 0.05 | 11.23 |
| | 1997+ | 10.89 | 0.05 | 11.14 |

* WHERE :
BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

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TABLE 2.7.2A

DATE : MAY 25, 1985

## EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
## HEAVY DUTY DIESEL POWERED VEHICLES
## TOTAL HC

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 10.8 | 1962 | 10.8 | 1963 | 10.8 | 1964 | 10.8 | 1965 | 10.8 | 1966 | 11.6 | 1967 | 11.6 | 1968 | 11.6 | 1969 | 12.2 | 1970 | 12.2 | 1971 | 12.2 | 1972 | 12.7 |
| 1962 | 10.7 | 1963 | 10.7 | 1964 | 10.7 | 1965 | 10.7 | 1966 | 11.6 | 1967 | 11.6 | 1968 | 11.6 | 1969 | 12.1 | 1970 | 12.1 | 1971 | 12.1 | 1972 | 12.6 | 1973 | 12.6 |
| 1963 | 10.6 | 1964 | 10.6 | 1965 | 10.6 | 1966 | 11.5 | 1967 | 11.5 | 1968 | 11.5 | 1969 | 12.0 | 1970 | 12.0 | 1971 | 12.0 | 1972 | 12.5 | 1973 | 12.5 | 1974 | 12.5 |
| 1964 | 10.6 | 1965 | 10.6 | 1966 | 11.4 | 1967 | 11.4 | 1968 | 11.4 | 1969 | 11.9 | 1970 | 11.9 | 1971 | 11.9 | 1972 | 12.4 | 1973 | 12.4 | 1974 | 12.4 | 1975 | 12.3 |
| 1965 | 10.5 | 1966 | 11.3 | 1967 | 11.3 | 1968 | 11.3 | 1969 | 11.8 | 1970 | 11.8 | 1971 | 11.8 | 1972 | 12.3 | 1973 | 12.3 | 1974 | 12.3 | 1975 | 12.2 | 1976 | 12.2 |
| 1966 | 11.2 | 1967 | 11.2 | 1968 | 11.2 | 1969 | 11.7 | 1970 | 11.7 | 1971 | 11.7 | 1972 | 12.2 | 1973 | 12.2 | 1974 | 12.2 | 1975 | 12.1 | 1976 | 12.1 | 1977 | 12.1 |
| 1967 | 11.1 | 1968 | 11.1 | 1969 | 11.6 | 1970 | 11.6 | 1971 | 11.6 | 1972 | 12.1 | 1973 | 12.1 | 1974 | 12.1 | 1975 | 12.0 | 1976 | 12.0 | 1977 | 12.0 | 1978 | 12.0 |
| 1968 | 10.9 | 1969 | 11.4 | 1970 | 11.4 | 1971 | 11.4 | 1972 | 12.0 | 1973 | 12.0 | 1974 | 12.0 | 1975 | 11.9 | 1976 | 11.9 | 1977 | 11.9 | 1978 | 11.9 | 1979 | 11.9 |
| 1969 | 11.3 | 1970 | 11.3 | 1971 | 11.3 | 1972 | 11.8 | 1973 | 11.8 | 1974 | 11.8 | 1975 | 11.7 | 1976 | 11.7 | 1977 | 11.7 | 1978 | 11.7 | 1979 | 11.7 | 1980 | 10.9 |
| 1970 | 11.1 | 1971 | 11.1 | 1972 | 11.6 | 1973 | 11.6 | 1974 | 11.6 | 1975 | 11.6 | 1976 | 11.6 | 1977 | 11.6 | 1978 | 11.6 | 1979 | 11.6 | 1980 | 10.7 | 1981 | 10.7 |
| 1971 | 10.9 | 1972 | 11.5 | 1973 | 11.5 | 1974 | 11.5 | 1975 | 11.4 | 1976 | 11.4 | 1977 | 11.4 | 1978 | 11.4 | 1979 | 11.4 | 1980 | 10.5 | 1981 | 10.5 | 1982 | 9.5 |
| 1972 | 11.3 | 1973 | 11.3 | 1974 | 11.3 | 1975 | 11.2 | 1976 | 11.2 | 1977 | 11.2 | 1978 | 11.2 | 1979 | 11.2 | 1980 | 10.3 | 1981 | 10.3 | 1982 | 9.3 | 1983 | 9.3 |
| 1973 | 11.1 | 1974 | 11.1 | 1975 | 11.0 | 1976 | 11.0 | 1977 | 11.0 | 1978 | 11.0 | 1979 | 11.0 | 1980 | 10.1 | 1981 | 10.1 | 1982 | 9.2 | 1983 | 9.2 | 1984 | 9.2 |
| 1974 | 10.8 | 1975 | 10.7 | 1976 | 10.7 | 1977 | 10.7 | 1978 | 10.7 | 1979 | 10.7 | 1980 | 9.9 | 1981 | 9.9 | 1982 | 9.0 | 1983 | 9.0 | 1984 | 9.0 | 1985 | 7.8 |
| 1975 | 10.5 | 1976 | 10.5 | 1977 | 10.5 | 1978 | 10.5 | 1979 | 10.5 | 1980 | 9.6 | 1981 | 9.6 | 1982 | 8.7 | 1983 | 8.7 | 1984 | 8.7 | 1985 | 7.7 | 1986 | 6.3 |
| 1976 | 10.2 | 1977 | 10.2 | 1978 | 10.2 | 1979 | 10.2 | 1980 | 9.3 | 1981 | 9.3 | 1982 | 8.5 | 1983 | 8.5 | 1984 | 8.5 | 1985 | 7.6 | 1986 | 6.2 | 1987 | 6.0 |
| 1977 | 9.9 | 1978 | 9.9 | 1979 | 9.9 | 1980 | 9.0 | 1981 | 9.0 | 1982 | 8.2 | 1983 | 8.2 | 1984 | 8.2 | 1985 | 7.5 | 1986 | 6.1 | 1987 | 5.9 | 1988 | 5.9 |
| 1978 | 9.5 | 1979 | 9.5 | 1980 | 8.7 | 1981 | 8.7 | 1982 | 8.0 | 1983 | 8.0 | 1984 | 8.0 | 1985 | 7.4 | 1986 | 5.9 | 1987 | 5.8 | 1988 | 5.8 | 1989 | 5.8 |
| 1979 | 9.1 | 1980 | 8.3 | 1981 | 8.3 | 1982 | 7.6 | 1983 | 7.6 | 1984 | 7.6 | 1985 | 7.2 | 1986 | 5.8 | 1987 | 5.7 | 1988 | 5.7 | 1989 | 5.7 | 1990 | 5.7 |
| 1980 | 8.1 | 1981 | 8.1 | 1982 | 7.5 | 1983 | 7.5 | 1984 | 7.5 | 1985 | 7.2 | 1986 | 5.8 | 1987 | 5.6 | 1988 | 5.6 | 1989 | 5.6 | 1990 | 5.6 | 1991 | 5.6 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 12.7 | 1974 | 12.7 | 1975 | 12.6 | 1976 | 12.6 | 1977 | 12.6 | 1978 | 12.6 | 1979 | 12.6 | 1980 | 11.8 | 1981 | 11.8 | 1982 | 10.5 | 1983 | 10.5 | 1984 | 10.5 |
| 1974 | 12.6 | 1975 | 12.5 | 1976 | 12.5 | 1977 | 12.5 | 1978 | 12.5 | 1979 | 12.5 | 1980 | 11.7 | 1981 | 11.7 | 1982 | 10.4 | 1983 | 10.4 | 1984 | 10.4 | 1985 | 8. |
| 1975 | 12.4 | 1976 | 12.4 | 1977 | 12.4 | 1978 | 12.4 | 1979 | 12.4 | 1980 | 11.6 | 1981 | 11.6 | 1982 | 10.4 | 1983 | 10.4 | 1984 | 10.4 | 1985 | 8.3 | 1986 | 6. |
| 1976 | 12.3 | 1977 | 12.3 | 1978 | 12.3 | 1979 | 12.3 | 1980 | 11.5 | 1981 | 11.5 | 1982 | 10.3 | 1983 | 10.3 | 1984 | 10.3 | 1985 | 8.3 | 1986 | 6.9 | 1987 | 6. |
| 1977 | 12.2 | 1978 | 12.2 | 1979 | 12.2 | 1980 | 11.4 | 1981 | 11.4 | 1982 | 10.2 | 1983 | 10.2 | 1984 | 10.2 | 1985 | 8.3 | 1986 | 6.8 | 1987 | 6.7 | 1988 | 6. |
| 1978 | 12.1 | 1979 | 12.1 | 1980 | 11.3 | 1981 | 11.3 | 1982 | 10.1 | 1983 | 10.1 | 1984 | 10.1 | 1985 | 8.2 | 1986 | 6.8 | 1987 | 6.6 | 1988 | 6.6 | 1989 | 6.6 |
| 1979 | 12.0 | 1980 | 11.2 | 1981 | 11.2 | 1982 | 10.0 | 1983 | 10.0 | 1984 | 10.0 | 1985 | 8.2 | 1986 | 6.8 | 1987 | 6.6 | 1988 | 6.6 | 1989 | 6.6 | 1990 | 6.6 |
| 1980 | 11.0 | 1981 | 11.0 | 1982 | 9.9 | 1983 | 9.9 | 1984 | 9.9 | 1985 | 8.1 | 1986 | 6.7 | 1987 | 6.6 | 1988 | 6.6 | 1989 | 6.6 | 1990 | 6.6 | 1991 | 6.6 |
| 1981 | 10.9 | 1982 | 9.8 | 1983 | 9.8 | 1984 | 9.8 | 1985 | 8.1 | 1986 | 6.7 | 1987 | 6.5 | 1988 | 6.5 | 1989 | 6.5 | 1990 | 6.5 | 1991 | 6.5 | 1992 | 6.5 |
| 1982 | 9.6 | 1983 | 9.6 | 1984 | 9.6 | 1985 | 8.0 | 1986 | 6.6 | 1987 | 6.5 | 1988 | 6.5 | 1989 | 6.5 | 1990 | 6.5 | 1991 | 6.5 | 1992 | 6.5 | 1993 | 6.4 |
| 1983 | 9.5 | 1984 | 9.5 | 1985 | 8.0 | 1986 | 6.6 | 1987 | 6.4 | 1988 | 6.4 | 1989 | 6.4 | 1990 | 6.4 | 1991 | 6.4 | 1992 | 6.4 | 1993 | 6.3 | 1994 | 6.3 |
| 1984 | 9.3 | 1985 | 7.9 | 1986 | 6.5 | 1987 | 6.3 | 1988 | 6.3 | 1989 | 6.3 | 1990 | 6.3 | 1991 | 6.3 | 1992 | 6.3 | 1993 | 6.2 | 1994 | 6.2 | 1995 | 6.2 |
| 1985 | 7.8 | 1986 | 6.4 | 1987 | 6.3 | 1988 | 6.3 | 1989 | 6.3 | 1990 | 6.3 | 1991 | 6.3 | 1992 | 6.3 | 1993 | 6.2 | 1994 | 6.2 | 1995 | 6.2 | 1996 | 6.2 |
| 1986 | 6.3 | 1987 | 6.2 | 1988 | 6.2 | 1989 | 6.2 | 1990 | 6.2 | 1991 | 6.2 | 1992 | 6.2 | 1993 | 6.1 | 1994 | 6.1 | 1995 | 6.1 | 1996 | 6.1 | 1997 | 6.0 |
| 1987 | 6.1 | 1988 | 6.1 | 1989 | 6.1 | 1990 | 6.1 | 1991 | 6.1 | 1992 | 6.1 | 1993 | 6.0 | 1994 | 6.0 | 1995 | 6.0 | 1996 | 6.0 | 1997 | 5.9 | 1998 | 5.9 |
| 1988 | 6.0 | 1989 | 6.0 | 1990 | 6.0 | 1991 | 6.0 | 1992 | 6.0 | 1993 | 5.9 | 1994 | 5.9 | 1995 | 5.9 | 1996 | 5.9 | 1997 | 5.9 | 1998 | 5.9 | 1999 | 5.9 |
| 1989 | 5.9 | 1990 | 5.9 | 1991 | 5.9 | 1992 | 5.9 | 1993 | 5.8 | 1994 | 5.8 | 1995 | 5.8 | 1996 | 5.8 | 1997 | 5.7 | 1998 | 5.7 | 1999 | 5.7 | 2000 | 5.7 |
| 1990 | 5.8 | 1991 | 5.8 | 1992 | 5.8 | 1993 | 5.7 | 1994 | 5.7 | 1995 | 5.7 | 1996 | 5.7 | 1997 | 5.6 | 1998 | 5.6 | 1999 | 5.6 | 2000 | 5.6 | 2001 | 5.6 |
| 1991 | 5.7 | 1992 | 5.7 | 1993 | 5.6 | 1994 | 5.6 | 1995 | 5.6 | 1996 | 5.6 | 1997 | 5.5 | 1998 | 5.5 | 1999 | 5.5 | 2000 | 5.5 | 2001 | 5.5 | 2002 | 5.5 |
| 1992 | 5.6 | 1993 | 5.5 | 1994 | 5.5 | 1995 | 5.5 | 1996 | 5.5 | 1997 | 5.4 | 1998 | 5.4 | 1999 | 5.4 | 2000 | 5.4 | 2001 | 5.4 | 2002 | 5.4 | 2003 | 5.4 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F. Emissions are based on the January 1 mileage accumulation figures given in Table 2.7.4.

TABLE 2.7.2B

DATE : MAY 25, 1985

## EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE HEAVY DUTY DIESEL POWERED VEHICLES CO

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 25.7 | 1962 | 25.7 | 1963 | 25.7 | 1964 | 25.7 | 1965 | 25.7 | 1966 | 26.3 | 1967 | 26.3 | 1968 | 26.3 | 1969 | 28.0 | 1970 | 28.0 | 1971 | 28.0 | 1972 | 29.8 |
| 1962 | 25.5 | 1963 | 25.5 | 1964 | 25.5 | 1965 | 25.5 | 1966 | 26.1 | 1967 | 26.1 | 1968 | 26.1 | 1969 | 27.8 | 1970 | 27.8 | 1971 | 27.8 | 1972 | 29.6 | 1973 | 29.6 |
| 1963 | 25.3 | 1964 | 25.3 | 1965 | 25.3 | 1966 | 25.9 | 1967 | 25.9 | 1968 | 25.9 | 1969 | 27.6 | 1970 | 27.6 | 1971 | 27.6 | 1972 | 29.3 | 1973 | 29.3 | 1974 | 29.3 |
| 1964 | 25.1 | 1965 | 25.1 | 1966 | 25.7 | 1967 | 25.7 | 1968 | 25.7 | 1969 | 27.4 | 1970 | 27.4 | 1971 | 27.4 | 1972 | 29.1 | 1973 | 29.1 | 1974 | 29.1 | 1975 | 28.6 |
| 1965 | 24.8 | 1966 | 25.4 | 1967 | 25.4 | 1968 | 25.4 | 1969 | 27.1 | 1970 | 27.1 | 1971 | 27.1 | 1972 | 28.8 | 1973 | 28.8 | 1974 | 28.8 | 1975 | 28.3 | 1976 | 28.3 |
| 1966 | 25.2 | 1967 | 25.2 | 1968 | 25.2 | 1969 | 26.8 | 1970 | 26.8 | 1971 | 26.8 | 1972 | 28.5 | 1973 | 28.5 | 1974 | 28.5 | 1975 | 28.0 | 1976 | 28.0 | 1977 | 28.0 |
| 1967 | 24.9 | 1968 | 24.9 | 1969 | 26.5 | 1970 | 26.5 | 1971 | 26.5 | 1972 | 28.2 | 1973 | 28.2 | 1974 | 28.2 | 1975 | 27.7 | 1976 | 27.7 | 1977 | 27.7 | 1978 | 27.7 |
| 1968 | 24.6 | 1969 | 26.2 | 1970 | 26.2 | 1971 | 26.2 | 1972 | 27.8 | 1973 | 27.8 | 1974 | 27.8 | 1975 | 27.3 | 1976 | 27.3 | 1977 | 27.3 | 1978 | 27.3 | 1979 | 27.3 |
| 1969 | 25.8 | 1970 | 25.8 | 1971 | 25.8 | 1972 | 27.4 | 1973 | 27.4 | 1974 | 27.4 | 1975 | 27.0 | 1976 | 27.0 | 1977 | 27.0 | 1978 | 27.0 | 1979 | 27.0 | 1980 | 23.1 |
| 1970 | 25.4 | 1971 | 25.4 | 1972 | 27.0 | 1973 | 27.0 | 1974 | 27.0 | 1975 | 26.5 | 1976 | 26.5 | 1977 | 26.5 | 1978 | 26.5 | 1979 | 26.5 | 1980 | 22.7 | 1981 | 22.7 |
| 1971 | 25.0 | 1972 | 26.5 | 1973 | 26.5 | 1974 | 26.5 | 1975 | 26.0 | 1976 | 26.0 | 1977 | 26.0 | 1978 | 26.0 | 1979 | 26.0 | 1980 | 22.3 | 1981 | 22.3 | 1982 | 20.6 |
| 1972 | 26.0 | 1973 | 26.0 | 1974 | 26.0 | 1975 | 25.5 | 1976 | 25.5 | 1977 | 25.5 | 1978 | 25.5 | 1979 | 25.5 | 1980 | 21.9 | 1981 | 21.9 | 1982 | 20.2 | 1983 | 20.2 |
| 1973 | 25.4 | 1974 | 25.4 | 1975 | 24.9 | 1976 | 24.9 | 1977 | 24.9 | 1978 | 24.9 | 1979 | 24.9 | 1980 | 21.4 | 1981 | 21.4 | 1982 | 19.7 | 1983 | 19.7 | 1984 | 19.7 |
| 1974 | 24.8 | 1975 | 24.3 | 1976 | 24.3 | 1977 | 24.3 | 1978 | 24.3 | 1979 | 24.3 | 1980 | 20.8 | 1981 | 20.8 | 1982 | 19.2 | 1983 | 19.2 | 1984 | 19.2 | 1985 | 18.4 |
| 1975 | 23.6 | 1976 | 23.6 | 1977 | 23.6 | 1978 | 23.6 | 1979 | 23.6 | 1980 | 20.2 | 1981 | 20.2 | 1982 | 18.6 | 1983 | 18.6 | 1984 | 18.6 | 1985 | 17.8 | 1986 | 17.6 |
| 1976 | 22.9 | 1977 | 22.9 | 1978 | 22.9 | 1979 | 22.9 | 1980 | 19.5 | 1981 | 19.5 | 1982 | 18.0 | 1983 | 18.0 | 1984 | 18.0 | 1985 | 17.3 | 1986 | 17.0 | 1987 | 16.6 |
| 1977 | 22.0 | 1978 | 22.0 | 1979 | 22.0 | 1980 | 18.8 | 1981 | 18.8 | 1982 | 17.3 | 1983 | 17.3 | 1984 | 17.3 | 1985 | 16.6 | 1986 | 16.4 | 1987 | 16.0 | 1988 | 16.0 |
| 1978 | 21.1 | 1979 | 21.1 | 1980 | 18.0 | 1981 | 18.0 | 1982 | 16.6 | 1983 | 16.6 | 1984 | 16.6 | 1985 | 16.0 | 1986 | 15.7 | 1987 | 15.3 | 1988 | 15.3 | 1989 | 15.3 |
| 1979 | 20.1 | 1980 | 17.1 | 1981 | 17.1 | 1982 | 15.8 | 1983 | 15.8 | 1984 | 15.8 | 1985 | 15.2 | 1986 | 14.9 | 1987 | 14.5 | 1988 | 14.5 | 1989 | 14.5 | 1990 | 14.5 |
| 1980 | 16.6 | 1981 | 16.6 | 1982 | 15.3 | 1983 | 15.3 | 1984 | 15.3 | 1985 | 14.8 | 1986 | 14.5 | 1987 | 14.1 | 1988 | 14.1 | 1989 | 14.1 | 1990 | 14.1 | 1991 | 14.1 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 29.8 | 1974 | 29.8 | 1975 | 29.3 | 1976 | 29.3 | 1977 | 29.3 | 1978 | 29.3 | 1979 | 29.3 | 1980 | 25.1 | 1981 | 25.1 | 1982 | 23.2 | 1983 | 23.2 | 1984 | 23.2 |
| 1974 | 29.6 | 1975 | 29.1 | 1976 | 29.1 | 1977 | 29.1 | 1978 | 29.1 | 1979 | 29.1 | 1980 | 25.0 | 1981 | 25.0 | 1982 | 23.0 | 1983 | 23.0 | 1984 | 23.0 | 1985 | 21.9 |
| 1975 | 28.8 | 1976 | 28.8 | 1977 | 28.8 | 1978 | 28.8 | 1979 | 28.8 | 1980 | 24.8 | 1981 | 24.8 | 1982 | 22.9 | 1983 | 22.9 | 1984 | 22.9 | 1985 | 21.8 | 1986 | 21.5 |
| 1976 | 28.6 | 1977 | 28.6 | 1978 | 28.6 | 1979 | 28.6 | 1980 | 24.5 | 1981 | 24.5 | 1982 | 22.7 | 1983 | 22.7 | 1984 | 22.7 | 1985 | 21.6 | 1986 | 21.3 | 1987 | 20.9 |
| 1977 | 28.3 | 1978 | 28.3 | 1979 | 28.3 | 1980 | 24.3 | 1981 | 24.3 | 1982 | 22.4 | 1983 | 22.4 | 1984 | 22.4 | 1985 | 21.4 | 1986 | 21.1 | 1987 | 20.7 | 1988 | 20.7 |
| 1978 | 28.0 | 1979 | 28.0 | 1980 | 24.1 | 1981 | 24.1 | 1982 | 22.2 | 1983 | 22.2 | 1984 | 22.2 | 1985 | 21.2 | 1986 | 20.9 | 1987 | 20.5 | 1988 | 20.5 | 1989 | 20.5 |
| 1979 | 27.7 | 1980 | 23.8 | 1981 | 23.8 | 1982 | 21.9 | 1983 | 21.9 | 1984 | 21.9 | 1985 | 20.9 | 1986 | 20.6 | 1987 | 20.2 | 1988 | 20.2 | 1989 | 20.2 | 1990 | 20.2 |
| 1980 | 23.5 | 1981 | 23.5 | 1982 | 21.6 | 1983 | 21.6 | 1984 | 21.6 | 1985 | 20.6 | 1986 | 20.4 | 1987 | 20.0 | 1988 | 20.0 | 1989 | 20.0 | 1990 | 20.0 | 1991 | 20.0 |
| 1981 | 23.1 | 1982 | 21.3 | 1983 | 21.3 | 1984 | 21.3 | 1985 | 20.3 | 1986 | 20.1 | 1987 | 19.7 | 1988 | 19.7 | 1989 | 19.7 | 1990 | 19.7 | 1991 | 19.7 | 1992 | 19.7 |
| 1982 | 21.0 | 1983 | 21.0 | 1984 | 21.0 | 1985 | 20.0 | 1986 | 19.8 | 1987 | 19.4 | 1988 | 19.4 | 1989 | 19.4 | 1990 | 19.4 | 1991 | 19.4 | 1992 | 19.4 | 1993 | 19.1 |
| 1983 | 20.6 | 1984 | 20.6 | 1985 | 19.7 | 1986 | 19.4 | 1987 | 19.0 | 1988 | 19.0 | 1989 | 19.0 | 1990 | 19.0 | 1991 | 19.0 | 1992 | 19.0 | 1993 | 18.7 | 1994 | 18.7 |
| 1984 | 20.2 | 1985 | 19.3 | 1986 | 19.0 | 1987 | 18.6 | 1988 | 18.6 | 1989 | 18.6 | 1990 | 18.6 | 1991 | 18.6 | 1992 | 18.6 | 1993 | 18.4 | 1994 | 18.4 | 1995 | 18.4 |
| 1985 | 18.8 | 1986 | 18.6 | 1987 | 18.2 | 1988 | 18.2 | 1989 | 18.2 | 1990 | 18.2 | 1991 | 18.2 | 1992 | 18.2 | 1993 | 17.9 | 1994 | 17.9 | 1995 | 17.9 | 1996 | 17.9 |
| 1986 | 18.1 | 1987 | 17.7 | 1988 | 17.7 | 1989 | 17.7 | 1990 | 17.7 | 1991 | 17.7 | 1992 | 17.7 | 1993 | 17.4 | 1994 | 17.4 | 1995 | 17.4 | 1996 | 17.4 | 1997 | 17.0 |
| 1987 | 17.2 | 1988 | 17.2 | 1989 | 17.2 | 1990 | 17.2 | 1991 | 17.2 | 1992 | 17.2 | 1993 | 16.9 | 1994 | 16.9 | 1995 | 16.9 | 1996 | 16.9 | 1997 | 16.6 | 1998 | 16.6 |
| 1988 | 16.6 | 1989 | 16.6 | 1990 | 16.6 | 1991 | 16.6 | 1992 | 16.6 | 1993 | 16.4 | 1994 | 16.4 | 1995 | 16.4 | 1996 | 16.4 | 1997 | 16.0 | 1998 | 16.0 | 1999 | 16.0 |
| 1989 | 16.0 | 1990 | 16.0 | 1991 | 16.0 | 1992 | 16.0 | 1993 | 15.7 | 1994 | 15.7 | 1995 | 15.7 | 1996 | 15.7 | 1997 | 15.5 | 1998 | 15.5 | 1999 | 15.5 | 2000 | 15.5 |
| 1990 | 15.3 | 1991 | 15.3 | 1992 | 15.3 | 1993 | 15.0 | 1994 | 15.0 | 1995 | 15.0 | 1996 | 15.0 | 1997 | 14.8 | 1998 | 14.8 | 1999 | 14.8 | 2000 | 14.8 | 2001 | 14.8 |
| 1991 | 14.5 | 1992 | 14.5 | 1993 | 14.3 | 1994 | 14.3 | 1995 | 14.3 | 1996 | 14.3 | 1997 | 14.1 | 1998 | 14.1 | 1999 | 14.1 | 2000 | 14.1 | 2001 | 14.1 | 2002 | 14.1 |
| 1992 | 14.1 | 1993 | 13.9 | 1994 | 13.9 | 1995 | 13.9 | 1996 | 13.9 | 1997 | 13.8 | 1998 | 13.8 | 1999 | 13.8 | 2000 | 13.8 | 2001 | 13.8 | 2002 | 13.8 | 2003 | 13.8 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F. Emissions are based on the January 1 mileage accumulation figures given in Table 2.7.4.

TABLE 2.7.2C

DATE : MAY 25, 1985

# EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE HEAVY DUTY DIESEL POWERED VEHICLES NOx

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 21.9 | 1962 | 21.9 | 1963 | 21.8 | 1964 | 21.8 | 1965 | 21.8 | 1966 | 22.6 | 1967 | 22.6 | 1968 | 22.6 | 1969 | 24.1 | 1970 | 24.1 | 1971 | 24.1 | 1972 | 25.5 |
| 1962 | 21.9 | 1963 | 21.8 | 1964 | 21.8 | 1965 | 21.8 | 1966 | 22.6 | 1967 | 22.6 | 1968 | 22.6 | 1969 | 24.1 | 1970 | 24.1 | 1971 | 24.1 | 1972 | 25.5 | 1973 | 25.5 |
| 1963 | 21.8 | 1964 | 21.8 | 1965 | 21.8 | 1966 | 22.6 | 1967 | 22.6 | 1968 | 22.6 | 1969 | 24.1 | 1970 | 24.1 | 1971 | 24.1 | 1972 | 25.5 | 1973 | 25.5 | 1974 | 25.5 |
| 1964 | 21.8 | 1965 | 21.8 | 1966 | 22.6 | 1967 | 22.6 | 1968 | 22.6 | 1969 | 24.1 | 1970 | 24.1 | 1971 | 24.1 | 1972 | 25.5 | 1973 | 25.5 | 1974 | 25.5 | 1975 | 24.8 |
| 1965 | 21.8 | 1966 | 22.6 | 1967 | 22.6 | 1968 | 22.6 | 1969 | 24.1 | 1970 | 24.1 | 1971 | 24.1 | 1972 | 25.5 | 1973 | 25.5 | 1974 | 25.5 | 1975 | 24.8 | 1976 | 24.8 |
| 1966 | 22.6 | 1967 | 22.6 | 1968 | 22.6 | 1969 | 24.1 | 1970 | 24.1 | 1971 | 24.1 | 1972 | 25.5 | 1973 | 25.5 | 1974 | 25.5 | 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 |
| 1967 | 22.6 | 1968 | 22.6 | 1969 | 24.1 | 1970 | 24.1 | 1971 | 24.1 | 1972 | 25.5 | 1973 | 25.5 | 1974 | 25.5 | 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 |
| 1968 | 22.6 | 1969 | 24.1 | 1970 | 24.1 | 1971 | 24.1 | 1972 | 25.5 | 1973 | 25.5 | 1974 | 25.5 | 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 |
| 1969 | 24.1 | 1970 | 24.1 | 1971 | 24.1 | 1972 | 25.5 | 1973 | 25.5 | 1974 | 25.5 | 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 |
| 1970 | 24.1 | 1971 | 24.1 | 1972 | 25.5 | 1973 | 25.5 | 1974 | 25.5 | 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 |
| 1971 | 24.1 | 1972 | 25.5 | 1973 | 25.5 | 1974 | 25.5 | 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 |
| 1972 | 25.5 | 1973 | 25.5 | 1974 | 25.5 | 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 |
| 1973 | 25.5 | 1974 | 25.5 | 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 |
| 1974 | 25.5 | 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 |
| 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 |
| 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 12.2 |
| 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 12.0 | 1988 | 12.0 |
| 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 11.7 | 1988 | 11.7 | 1989 | 11.7 |
| 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 11.4 | 1988 | 11.4 | 1989 | 11.4 | 1990 | 11.4 |
| 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 11.2 | 1988 | 11.2 | 1989 | 11.2 | 1990 | 11.2 | 1991 | 11.2 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 25.5 | 1974 | 25.5 | 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 |
| 1974 | 25.5 | 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 |
| 1975 | 24.8 | 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 |
| 1976 | 24.8 | 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 14.0 |
| 1977 | 24.8 | 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 13.9 | 1988 | 13.9 |
| 1978 | 24.8 | 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 13.8 | 1988 | 13.8 | 1989 | 13.8 |
| 1979 | 24.8 | 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 13.7 | 1988 | 13.7 | 1989 | 13.7 | 1990 | 13.7 |
| 1980 | 20.5 | 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 13.6 | 1988 | 13.6 | 1989 | 13.6 | 1990 | 13.6 | 1991 | 13.6 |
| 1981 | 20.5 | 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 13.5 | 1988 | 13.5 | 1989 | 13.5 | 1990 | 13.5 | 1991 | 13.5 | 1992 | 13.5 |
| 1982 | 18.9 | 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 13.4 | 1988 | 13.4 | 1989 | 13.4 | 1990 | 13.4 | 1991 | 13.4 | 1992 | 13.4 | 1993 | 13.2 |
| 1983 | 18.9 | 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 13.2 | 1988 | 13.2 | 1989 | 13.2 | 1990 | 13.2 | 1991 | 13.2 | 1992 | 13.2 | 1993 | 13.0 | 1994 | 13.0 |
| 1984 | 18.9 | 1985 | 18.2 | 1986 | 17.9 | 1987 | 13.1 | 1988 | 13.1 | 1989 | 13.1 | 1990 | 13.1 | 1991 | 13.1 | 1992 | 13.1 | 1993 | 12.8 | 1994 | 12.8 | 1995 | 12.8 |
| 1985 | 18.2 | 1986 | 17.9 | 1987 | 12.9 | 1988 | 12.9 | 1989 | 12.9 | 1990 | 12.9 | 1991 | 12.9 | 1992 | 12.9 | 1993 | 12.7 | 1994 | 12.7 | 1995 | 12.7 | 1996 | 12.7 |
| 1986 | 17.9 | 1987 | 12.7 | 1988 | 12.7 | 1989 | 12.7 | 1990 | 12.7 | 1991 | 12.7 | 1992 | 12.7 | 1993 | 12.5 | 1994 | 12.5 | 1995 | 12.5 | 1996 | 12.5 | 1997 | 12.4 |
| 1987 | 12.5 | 1988 | 12.5 | 1989 | 12.5 | 1990 | 12.5 | 1991 | 12.5 | 1992 | 12.5 | 1993 | 12.3 | 1994 | 12.3 | 1995 | 12.3 | 1996 | 12.3 | 1997 | 12.2 | 1998 | 12.2 |
| 1988 | 12.2 | 1989 | 12.2 | 1990 | 12.2 | 1991 | 12.2 | 1992 | 12.2 | 1993 | 12.0 | 1994 | 12.0 | 1995 | 12.0 | 1996 | 12.0 | 1997 | 11.9 | 1998 | 11.9 | 1999 | 11.9 |
| 1989 | 12.0 | 1990 | 12.0 | 1991 | 12.0 | 1992 | 12.0 | 1993 | 11.8 | 1994 | 11.8 | 1995 | 11.8 | 1996 | 11.8 | 1997 | 11.7 | 1998 | 11.7 | 1999 | 11.7 | 2000 | 11.7 |
| 1990 | 11.7 | 1991 | 11.7 | 1992 | 11.7 | 1993 | 11.5 | 1994 | 11.5 | 1995 | 11.5 | 1996 | 11.5 | 1997 | 11.4 | 1998 | 11.4 | 1999 | 11.4 | 2000 | 11.4 | 2001 | 11.4 |
| 1991 | 11.4 | 1992 | 11.4 | 1993 | 11.1 | 1994 | 11.1 | 1995 | 11.1 | 1996 | 11.1 | 1997 | 11.1 | 1998 | 11.1 | 1959 | 11.1 | 2000 | 11.1 | 2001 | 11.1 | 2002 | 11.1 |
| 1992 | 11.2 | 1993 | 11.0 | 1994 | 11.0 | 1995 | 11.0 | 1996 | 11.0 | 1997 | 10.9 | 1998 | 10.9 | 1999 | 10.9 | 2000 | 10.9 | 2001 | 10.9 | 2002 | 10.9 | 2003 | 10.9 |

*MY -- Indicates the model year

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F. Emissions are based on the January 1 mileage accumulation figures given in Table 2.7.4.

TABLE 2.7.3

### IDLE EMISSION RATES FOR HIGH ALTITUDE HEAVY DUTY DIESEL POWERED VEHICLES

* IER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Min.) | Deterioration Rate (Gm/Min/10K Mi) |
|---|---|---|---|
| HC | Pre-1963 | 0.83 | 0.0 |
| | 1963-1965 | 0.83 | 0.0 |
| | 1966-1968 | 0.83 | 0.0 |
| | 1969-1971 | 0.83 | 0.0 |
| | 1972-1974 | 0.83 | 0.0 |
| | 1975-1979 | 0.83 | 0.0 |
| | 1980-1981 | 0.83 | 0.0 |
| | 1982-1984 | 0.83 | 0.0 |
| | 1985 | 0.62 | 0.0 |
| | 1986 | 0.62 | 0.0 |
| | 1987-1992 | 0.62 | 0.0 |
| | 1993-1996 | 0.62 | 0.0 |
| | 1997+ | 0.62 | 0.0 |
| CO | Pre-1963 | 1.17 | 0.01 |
| | 1963-1965 | 1.17 | 0.01 |
| | 1966-1968 | 1.17 | 0.01 |
| | 1969-1971 | 1.17 | 0.01 |
| | 1972-1974 | 1.17 | 0.01 |
| | 1975-1979 | 1.17 | 0.01 |
| | 1980-1981 | 1.17 | 0.01 |
| | 1982-1984 | 1.17 | 0.01 |
| | 1985 | 1.17 | 0.01 |
| | 1986 | 1.17 | 0.01 |
| | 1987-1992 | 1.17 | 0.01 |
| | 1993-1996 | 1.17 | 0.01 |
| | 1997+ | 1.17 | 0.01 |
| NOx | Pre-1963 | 0.92 | 0.0 |
| | 1963-1965 | 0.92 | 0.0 |
| | 1966-1968 | 0.92 | 0.0 |
| | 1969-1971 | 0.92 | 0.0 |
| | 1972-1974 | 0.92 | 0.0 |
| | 1975-1979 | 0.92 | 0.0 |
| | 1980-1981 | 0.92 | 0.0 |
| | 1982-1984 | 0.92 | 0.0 |
| | 1985 | 0.22 | 0.0 |
| | 1986 | 0.22 | 0.0 |
| | 1987-1992 | 0.22 | 0.0 |
| | 1993-1996 | 0.22 | 0.0 |
| | 1997+ | 0.22 | 0.0 |

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

DATE : MAY 25, 1985

## TABLE 2.7.4

## REGISTRATION MIX AND MILEAGE ACCUMULATION RATES FOR HIGH ALTITUDE HEAVY DUTY DIESEL POWERED VEHICLES

| Model Year Index** | July 1 Registration Mix* | Mileage Accumulation Rate per vehicle* | Jan 1 Registration Mix | Jan 1 Mileage Accumulation Rate (fleet) | Jan 1 Mileage Accumulation (fleet) |
|---|---|---|---|---|---|
| 1 | 0.090 | 66333. | 0.0 | 0. | 0. |
| 2 | 0.151 | 60319. | 0.151 | 66333. | 33166. |
| 3 | 0.126 | 54855. | 0.126 | 60319. | 96492. |
| 4 | 0.105 | 49894. | 0.105 | 54855. | 154079. |
| 5 | 0.088 | 45386. | 0.088 | 49894. | 206454. |
| 6 | 0.073 | 41288. | 0.073 | 45386. | 254093. |
| 7 | 0.061 | 37565. | 0.061 | 41288. | 297430. |
| 8 | 0.051 | 34182. | 0.051 | 37565. | 336857. |
| 9 | 0.043 | 31105. | 0.043 | 34182. | 372730. |
| 10 | 0.036 | 28309. | 0.036 | 31105. | 405374. |
| 11 | 0.030 | 25766. | 0.030 | 28309. | 435081. |
| 12 | 0.025 | 23453. | 0.025 | 25766. | 462118. |
| 13 | 0.021 | 21350. | 0.021 | 23453. | 486727. |
| 14 | 0.017 | 19437. | 0.017 | 21350. | 509129. |
| 15 | 0.014 | 17697. | 0.014 | 19437. | 529522. |
| 16 | 0.012 | 16114. | 0.012 | 17697. | 548089. |
| 17 | 0.010 | 14673. | 0.010 | 16114. | 564994. |
| 18 | 0.008 | 13363. | 0.008 | 14673. | 580388. |
| 19 | 0.007 | 12170. | 0.007 | 13363. | 594406. |
| 20+ | 0.031 | 11085. | 0.031 | 12170. | 607173. |

* Default information that may be altered by the MOBILE3 user with information about the local area. This mileage distribution is applicable to calendar year 1988 only.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

DATE : MAY 25, 1985

## TABLE 2.7.5

## EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR HIGH ALTITUDE HEAVY DUTY DIESEL POWERED VEHICLES JANUARY 1, 1988

| Model Years | (A) HDDV Fleet Registration | (B) Sales Fraction | (A*B) | (C=A*B/DAF) HDDV Registration | (D) Annual Mileage Accrual Rate | (C*D) | (C*D/TFNORM) Travel Fractions |
|---|---|---|---|---|---|---|---|
| 1988 | 0.0 | 1.000 | 0.0 | 0.0 | 0. | 0.0 | 0.0 |
| 1987 | 0.151 | 1.000 | 0.151 | 0.166 | 66333. | 11019.0 | 0.240 |
| 1986 | 0.126 | 1.000 | 0.126 | 0.139 | 60319. | 8361.1 | 0.182 |
| 1985 | 0.105 | 1.000 | 0.105 | 0.116 | 54855. | 6336.4 | 0.138 |
| 1984 | 0.088 | 1.000 | 0.088 | 0.097 | 49894. | 4830.2 | 0.105 |
| 1983 | 0.073 | 1.000 | 0.073 | 0.080 | 45386. | 3644.8 | 0.079 |
| 1982 | 0.061 | 1.000 | 0.061 | 0.067 | 41288. | 2770.7 | 0.060 |
| 1981 | 0.051 | 1.000 | 0.051 | 0.056 | 37565. | 2107.6 | 0.046 |
| 1980 | 0.043 | 1.000 | 0.043 | 0.047 | 34182. | 1617.0 | 0.035 |
| 1979 | 0.036 | 1.000 | 0.036 | 0.040 | 31105. | 1231.9 | 0.027 |
| 1978 | 0.030 | 1.000 | 0.030 | 0.033 | 28309. | 934.3 | 0.020 |
| 1977 | 0.025 | 1.000 | 0.025 | 0.028 | 25766. | 708.6 | 0.015 |
| 1976 | 0.021 | 1.000 | 0.021 | 0.023 | 23453. | 541.8 | 0.012 |
| 1975 | 0.017 | 1.000 | 0.017 | 0.019 | 21350. | 399.3 | 0.009 |
| 1974 | 0.014 | 1.000 | 0.014 | 0.015 | 19437. | 299.4 | 0.007 |
| 1973 | 0.012 | 1.000 | 0.012 | 0.013 | 17697. | 233.6 | 0.005 |
| 1972 | 0.010 | 1.000 | 0.010 | 0.011 | 16114. | 177.3 | 0.004 |
| 1971 | 0.008 | 1.000 | 0.008 | 0.009 | 14673. | 129.1 | 0.003 |
| 1970 | 0.007 | 1.000 | 0.007 | 0.008 | 13363. | 102.9 | 0.002 |
| 1969- | 0.031 | 1.000 | 0.031 | 0.034 | 12170. | 415.1 | 0.009 |
|  |  | DAF: | 0.910 |  | TFNORM: | 45860.0 |  |

WHERE :

A = January 1 registration mix from Table 2.7.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 2.7.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI) = .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

DATE : MAY 25, 1985

# TABLE 2.7.6

# SPEED CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE HEAVY DUTY DIESEL POWERED VEHICLES

$* SCF(s) = EXP(A + B*s + C*s^2)$

| Pol | Model Years | Coefficients A | B | C |
|---|---|---|---|---|
| HC | All | 0.92400 | -0.05500 | 0.00044 |
| CO | All | 1.39600 | -0.08800 | 0.00091 |
| NOx | All | 0.67600 | -0.04800 | 0.00071 |

* WHERE: s = average speed (mph)

DATE : MAY 25, 1985

## TABLE 2.8.1A

## EXHAUST EMISSION RATES FOR HIGH ALTITUDE MOTORCYCLES (RATES REFLECT ZERO TAMPERING)

* BER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Mile) | Deterioration Rate (Gm/Mi/10K Mi) | 50,000 Mile Emission Level (Grams/Mile) |
|---|---|---|---|---|
| HC | Pre-1978 | 11.48 | 0.78 | 15.38 |
| | 1978-1979 | 4.30 | 1.65 | 12.55 |
| | 1980+ | 4.12 | 1.73 | 12.77 |
| CO | Pre-1978 | 51.59 | 2.47 | 63.94 |
| | 1978-1979 | 35.07 | 3.96 | 54.87 |
| | 1980+ | 34.95 | 2.02 | 45.05 |
| NOx | Pre-1978 | 0.11 | 0.06 | 0.41 |
| | 1978-1979 | 0.43 | 0.0 | 0.43 |
| | 1980+ | 0.57 | 0.0 | 0.57 |

* WHERE :
BER = Basic emission rate (untampered)
ZML = Zero mile level
DR = Deterioration rate
M = Cumulative mileage / 10,000

DATE : MAY 25, 1985

## TABLE 2.8.1B

## CRANKCASE AND EVAPORATIVE HYDROCARBON EMISSIONS FOR HIGH ALTITUDE MOTORCYCLES (RATES REFLECT ZERO TAMPERING)

** CCEV = (HSK * TPD + DNL)/MPD + CC

| Model Years | SHED Hot Soak Emissions (Gm/Trip) | Trips* Per Day | SHED Diurnal Emissions (Gm/Day) | Miles* Per Day | Crankcase Emissions (Gm/Mile) | Total Crankcase and Evap. Emissions (Gm/Mile) |
|---|---|---|---|---|---|---|
| Pre-1978 | 5.93 | 1.35 | 8.72 | 8.30 | 0.40 | 2.42 |
| 1978-1979 | 9.10 | 1.35 | 10.97 | 8.30 | 0.0 | 2.80 |
| 1980+ | 9.79 | 1.35 | 11.18 | 8.30 | 0.0 | 2.94 |

* Default information that may be altered by the MOBILE3 user with information about the local area.

** WHERE :

CCEV = Total untampered crankcase & evaporative HC emissions (Gm/Mile)
HSK = Hot soak emissions (Gm/Trip)
TPD = Trips per day
DNL = Diurnal emissions (Gm/Day)
MPD = Miles per day
CC = Crankcase emissions (Gm/Mile)

DATE : MAY 25, 1985

TABLE 2.8.2A

DATE : MAY 25, 1985

## EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE MOTORCYCLES
## TOTAL HC (INCLUDES EVAP & CRANKCASE)

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 15.0 | 1962 | 15.0 | 1963 | 15.0 | 1964 | 15.0 | 1965 | 15.0 | 1966 | 15.0 | 1967 | 15.0 | 1968 | 15.0 | 1969 | 15.0 | 1970 | 15.0 | 1971 | 15.0 | 1972 | 15.0 |
| 1962 | 15.0 | 1963 | 15.0 | 1964 | 15.0 | 1965 | 15.0 | 1966 | 15.0 | 1967 | 15.0 | 1968 | 15.0 | 1969 | 15.0 | 1970 | 15.0 | 1971 | 15.0 | 1972 | 15.0 | 1973 | 15.0 |
| 1963 | 15.0 | 1964 | 15.0 | 1965 | 15.0 | 1966 | 15.0 | 1967 | 15.0 | 1968 | 15.0 | 1969 | 15.0 | 1970 | 15.0 | 1971 | 15.0 | 1972 | 15.0 | 1973 | 15.0 | 1974 | 15.0 |
| 1964 | 15.0 | 1965 | 15.0 | 1966 | 15.0 | 1967 | 15.0 | 1968 | 15.0 | 1969 | 15.0 | 1970 | 15.0 | 1971 | 15.0 | 1972 | 15.0 | 1973 | 15.0 | 1974 | 15.0 | 1975 | 15.0 |
| 1965 | 15.0 | 1966 | 15.0 | 1967 | 15.0 | 1968 | 15.0 | 1969 | 15.0 | 1970 | 15.0 | 1971 | 15.0 | 1972 | 15.0 | 1973 | 15.0 | 1974 | 15.0 | 1975 | 15.0 | 1976 | 15.0 |
| 1966 | 15.0 | 1967 | 15.0 | 1968 | 15.0 | 1969 | 15.0 | 1970 | 15.0 | 1971 | 15.0 | 1972 | 15.0 | 1973 | 15.0 | 1974 | 15.0 | 1975 | 15.0 | 1976 | 15.0 | 1977 | 15.0 |
| 1967 | 15.0 | 1968 | 15.0 | 1969 | 15.0 | 1970 | 15.0 | 1971 | 15.0 | 1972 | 15.0 | 1973 | 15.0 | 1974 | 15.0 | 1975 | 15.0 | 1976 | 15.0 | 1977 | 15.0 | 1978 | 9.4 |
| 1968 | 15.0 | 1969 | 15.0 | 1970 | 15.0 | 1971 | 15.0 | 1972 | 15.0 | 1973 | 15.0 | 1974 | 15.0 | 1975 | 15.0 | 1976 | 15.0 | 1977 | 15.0 | 1978 | 9.4 | 1979 | 9.4 |
| 1969 | 15.0 | 1970 | 15.0 | 1971 | 15.0 | 1972 | 15.0 | 1973 | 15.0 | 1974 | 15.0 | 1975 | 15.0 | 1976 | 15.0 | 1977 | 15.0 | 1978 | 9.4 | 1979 | 9.4 | 1980 | 9.5 |
| 1970 | 15.0 | 1971 | 15.0 | 1972 | 15.0 | 1973 | 15.0 | 1974 | 15.0 | 1975 | 15.0 | 1976 | 15.0 | 1977 | 15.0 | 1978 | 9.4 | 1979 | 9.4 | 1980 | 9.5 | 1981 | 9.5 |
| 1971 | 15.0 | 1972 | 15.0 | 1973 | 15.0 | 1974 | 15.0 | 1975 | 15.0 | 1976 | 15.0 | 1977 | 15.0 | 1978 | 9.4 | 1979 | 9.4 | 1980 | 9.4 | 1981 | 9.4 | 1982 | 9.4 |
| 1972 | 14.9 | 1973 | 14.9 | 1974 | 14.9 | 1975 | 14.9 | 1976 | 14.9 | 1977 | 14.9 | 1978 | 9.3 | 1979 | 9.3 | 1980 | 9.4 | 1981 | 9.4 | 1982 | 9.4 | 1983 | 9.4 |
| 1973 | 14.9 | 1974 | 14.9 | 1975 | 14.9 | 1976 | 14.9 | 1977 | 14.9 | 1978 | 9.2 | 1979 | 9.2 | 1980 | 9.3 | 1981 | 9.3 | 1982 | 9.3 | 1983 | 9.3 | 1984 | 9.3 |
| 1974 | 14.8 | 1975 | 14.8 | 1976 | 14.8 | 1977 | 14.8 | 1978 | 9.1 | 1979 | 9.1 | 1980 | 9.2 | 1981 | 9.2 | 1982 | 9.2 | 1983 | 9.2 | 1984 | 9.2 | 1985 | 9.2 |
| 1975 | 14.8 | 1976 | 14.8 | 1977 | 14.8 | 1978 | 8.9 | 1979 | 8.9 | 1980 | 9.0 | 1981 | 9.0 | 1982 | 9.0 | 1983 | 9.0 | 1984 | 9.0 | 1985 | 9.0 | 1986 | 9.0 |
| 1976 | 14.7 | 1977 | 14.7 | 1978 | 8.7 | 1979 | 8.7 | 1980 | 8.8 | 1981 | 8.8 | 1982 | 8.8 | 1983 | 8.8 | 1984 | 8.8 | 1985 | 8.8 | 1986 | 8.8 | 1987 | 8.8 |
| 1977 | 14.5 | 1978 | 8.4 | 1979 | 8.4 | 1980 | 8.4 | 1981 | 8.4 | 1982 | 8.4 | 1983 | 8.4 | 1984 | 8.4 | 1985 | 8.4 | 1986 | 8.4 | 1987 | 8.4 | 1988 | 8.4 |
| 1978 | 8.0 | 1979 | 8.0 | 1980 | 8.0 | 1981 | 8.0 | 1982 | 8.0 | 1983 | 8.0 | 1984 | 8.0 | 1985 | 8.0 | 1986 | 8.0 | 1987 | 8.0 | 1988 | 8.0 | 1989 | 8.0 |
| 1979 | 7.4 | 1980 | 7.4 | 1981 | 7.4 | 1982 | 7.4 | 1983 | 7.4 | 1984 | 7.4 | 1985 | 7.4 | 1986 | 7.4 | 1987 | 7.4 | 1988 | 7.4 | 1989 | 7.4 | 1990 | 7.4 |
| 1980 | 7.1 | 1981 | 7.1 | 1982 | 7.1 | 1983 | 7.1 | 1984 | 7.1 | 1985 | 7.1 | 1986 | 7.1 | 1987 | 7.1 | 1988 | 7.1 | 1989 | 7.1 | 1990 | 7.1 | 1991 | 7.1 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 15.0 | 1974 | 15.0 | 1975 | 15.0 | 1976 | 15.0 | 1977 | 15.0 | 1978 | 9.4 | 1979 | 9.4 | 1980 | 9.5 | 1981 | 9.5 | 1982 | 9.5 | 1983 | 9.5 | 1984 | 9.5 |
| 1974 | 15.0 | 1975 | 15.0 | 1976 | 15.0 | 1977 | 15.0 | 1978 | 9.4 | 1979 | 9.4 | 1980 | 9.5 | 1981 | 9.5 | 1982 | 9.5 | 1983 | 9.5 | 1984 | 9.5 | 1985 | 9.5 |
| 1975 | 15.0 | 1976 | 15.0 | 1977 | 15.0 | 1978 | 9.4 | 1979 | 9.4 | 1980 | 9.5 | 1981 | 9.5 | 1982 | 9.5 | 1983 | 9.5 | 1984 | 9.5 | 1985 | 9.5 | 1986 | 9.5 |
| 1976 | 15.0 | 1977 | 15.0 | 1978 | 9.4 | 1979 | 9.4 | 1980 | 9.5 | 1981 | 9.5 | 1982 | 9.5 | 1983 | 9.5 | 1984 | 9.5 | 1985 | 9.5 | 1986 | 9.5 | 1987 | 9.5 |
| 1977 | 15.0 | 1978 | 9.4 | 1979 | 9.4 | 1980 | 9.5 | 1981 | 9.5 | 1982 | 9.5 | 1983 | 9.5 | 1984 | 9.5 | 1985 | 9.5 | 1986 | 9.5 | 1987 | 9.5 | 1988 | 9.5 |
| 1978 | 9.4 | 1979 | 9.4 | 1980 | 9.5 | 1981 | 9.5 | 1982 | 9.5 | 1983 | 9.5 | 1984 | 9.5 | 1985 | 9.5 | 1986 | 9.5 | 1987 | 9.5 | 1988 | 9.5 | 1989 | 9.5 |
| 1979 | 9.4 | 1980 | 9.5 | 1981 | 9.5 | 1982 | 9.5 | 1983 | 9.5 | 1984 | 9.5 | 1985 | 9.5 | 1986 | 9.5 | 1987 | 9.5 | 1988 | 9.5 | 1989 | 9.5 | 1990 | 9.5 |
| 1980 | 9.5 | 1981 | 9.5 | 1982 | 9.5 | 1983 | 9.5 | 1984 | 9.5 | 1985 | 9.5 | 1986 | 9.5 | 1987 | 9.5 | 1988 | 9.5 | 1989 | 9.5 | 1990 | 9.5 | 1991 | 9.5 |
| 1981 | 9.5 | 1982 | 9.5 | 1983 | 9.5 | 1984 | 9.5 | 1985 | 9.5 | 1986 | 9.5 | 1987 | 9.5 | 1988 | 9.5 | 1989 | 9.5 | 1990 | 9.5 | 1991 | 9.5 | 1992 | 9.5 |
| 1982 | 9.5 | 1983 | 9.5 | 1984 | 9.5 | 1985 | 9.5 | 1986 | 9.5 | 1987 | 9.5 | 1988 | 9.5 | 1989 | 9.5 | 1990 | 9.5 | 1991 | 9.5 | 1992 | 9.5 | 1993 | 9.5 |
| 1983 | 9.4 | 1984 | 9.4 | 1985 | 9.4 | 1986 | 9.4 | 1987 | 9.4 | 1988 | 9.4 | 1989 | 9.4 | 1990 | 9.4 | 1991 | 9.4 | 1992 | 9.4 | 1993 | 9.4 | 1994 | 9.4 |
| 1984 | 9.4 | 1985 | 9.4 | 1986 | 9.4 | 1987 | 9.4 | 1988 | 9.4 | 1989 | 9.4 | 1990 | 9.4 | 1991 | 9.4 | 1992 | 9.4 | 1993 | 9.4 | 1994 | 9.4 | 1995 | 9.4 |
| 1985 | 9.3 | 1986 | 9.3 | 1987 | 9.3 | 1988 | 9.3 | 1989 | 9.3 | 1990 | 9.3 | 1991 | 9.3 | 1992 | 9.3 | 1993 | 9.3 | 1994 | 9.3 | 1995 | 9.3 | 1996 | 9.3 |
| 1986 | 9.2 | 1987 | 9.2 | 1988 | 9.2 | 1989 | 9.2 | 1990 | 9.2 | 1991 | 9.2 | 1992 | 9.2 | 1993 | 9.2 | 1994 | 9.2 | 1995 | 9.2 | 1996 | 9.2 | 1997 | 9.2 |
| 1987 | 9.0 | 1988 | 9.0 | 1989 | 9.0 | 1990 | 9.0 | 1991 | 9.0 | 1992 | 9.0 | 1993 | 9.0 | 1994 | 9.0 | 1995 | 9.0 | 1996 | 9.0 | 1997 | 9.0 | 1998 | 9.0 |
| 1988 | 8.8 | 1989 | 8.8 | 1990 | 8.8 | 1991 | 8.8 | 1992 | 8.8 | 1993 | 8.8 | 1994 | 8.8 | 1995 | 8.8 | 1996 | 8.8 | 1997 | 8.8 | 1998 | 8.8 | 1999 | 8.8 |
| 1989 | 8.4 | 1990 | 8.4 | 1991 | 8.4 | 1992 | 8.4 | 1993 | 8.4 | 1994 | 8.4 | 1995 | 8.4 | 1996 | 8.4 | 1997 | 8.4 | 1998 | 8.4 | 1999 | 8.4 | 2000 | 8.4 |
| 1990 | 8.0 | 1991 | 8.0 | 1992 | 8.0 | 1993 | 8.0 | 1994 | 8.0 | 1995 | 8.0 | 1996 | 8.0 | 1997 | 8.0 | 1998 | 8.0 | 1999 | 8.0 | 2000 | 8.0 | 2001 | 8.0 |
| 1991 | 7.4 | 1992 | 7.4 | 1993 | 7.4 | 1994 | 7.4 | 1995 | 7.4 | 1996 | 7.4 | 1997 | 7.4 | 1998 | 7.4 | 1999 | 7.4 | 2000 | 7.4 | 2001 | 7.4 | 2002 | 7.4 |
| 1992 | 7.1 | 1993 | 7.1 | 1994 | 7.1 | 1995 | 7.1 | 1996 | 7.1 | 1997 | 7.1 | 1998 | 7.1 | 1999 | 7.1 | 2000 | 7.1 | 2001 | 7.1 | 2002 | 7.1 | 2003 | 7.1 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.8.4.

TABLE 2.8.2B

DATE : MAY 25, 1985

## EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
## MOTORCYCLES
## CO

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 55.1 | 1962 | 55.1 | 1963 | 55.1 | 1964 | 55.1 | 1965 | 55.1 | 1966 | 55.1 | 1967 | 55.1 | 1968 | 55.1 | 1969 | 55.1 | 1970 | 55.1 | 1971 | 55.1 | 1972 | 55.1 |
| 1962 | 55.1 | 1963 | 55.1 | 1964 | 55.1 | 1965 | 55.1 | 1966 | 55.1 | 1967 | 55.1 | 1968 | 55.1 | 1969 | 55.1 | 1970 | 55.1 | 1971 | 55.1 | 1972 | 55.1 | 1973 | 55.1 |
| 1963 | 55.1 | 1964 | 55.1 | 1965 | 55.1 | 1966 | 55.1 | 1967 | 55.1 | 1968 | 55.1 | 1969 | 55.1 | 1970 | 55.1 | 1971 | 55.1 | 1972 | 55.1 | 1973 | 55.1 | 1974 | 55.1 |
| 1964 | 55.1 | 1965 | 55.1 | 1966 | 55.1 | 1967 | 55.1 | 1968 | 55.1 | 1969 | 55.1 | 1970 | 55.1 | 1971 | 55.1 | 1972 | 55.1 | 1973 | 55.1 | 1974 | 55.1 | 1975 | 55.1 |
| 1965 | 55.1 | 1966 | 55.1 | 1967 | 55.1 | 1968 | 55.1 | 1969 | 55.1 | 1970 | 55.1 | 1971 | 55.1 | 1972 | 55.1 | 1973 | 55.1 | 1974 | 55.1 | 1975 | 55.1 | 1976 | 55.1 |
| 1966 | 55.1 | 1967 | 55.1 | 1968 | 55.1 | 1969 | 55.1 | 1970 | 55.1 | 1971 | 55.1 | 1972 | 55.1 | 1973 | 55.1 | 1974 | 55.1 | 1975 | 55.1 | 1976 | 55.1 | 1977 | 55.1 |
| 1967 | 55.1 | 1968 | 55.1 | 1969 | 55.1 | 1970 | 55.1 | 1971 | 55.1 | 1972 | 55.1 | 1973 | 55.1 | 1974 | 55.1 | 1975 | 55.1 | 1976 | 55.1 | 1977 | 55.1 | 1978 | 40.7 |
| 1968 | 55.1 | 1969 | 55.1 | 1970 | 55.1 | 1971 | 55.1 | 1972 | 55.1 | 1973 | 55.1 | 1974 | 55.1 | 1975 | 55.1 | 1976 | 55.1 | 1977 | 55.1 | 1978 | 40.7 | 1979 | 40.7 |
| 1969 | 55.0 | 1970 | 55.0 | 1971 | 55.0 | 1972 | 55.0 | 1973 | 55.0 | 1974 | 55.0 | 1975 | 55.0 | 1976 | 55.0 | 1977 | 55.0 | 1978 | 40.6 | 1979 | 40.6 | 1980 | 37.8 |
| 1970 | 55.0 | 1971 | 55.0 | 1972 | 55.0 | 1973 | 55.0 | 1974 | 55.0 | 1975 | 55.0 | 1976 | 55.0 | 1977 | 55.0 | 1978 | 40.6 | 1979 | 40.6 | 1980 | 37.7 | 1981 | 37.7 |
| 1971 | 54.9 | 1972 | 54.9 | 1973 | 54.9 | 1974 | 54.9 | 1975 | 54.9 | 1976 | 54.9 | 1977 | 54.9 | 1978 | 40.5 | 1979 | 40.5 | 1980 | 37.7 | 1981 | 37.7 | 1982 | 37.7 |
| 1972 | 54.9 | 1973 | 54.9 | 1974 | 54.9 | 1975 | 54.9 | 1976 | 54.9 | 1977 | 54.9 | 1978 | 40.4 | 1979 | 40.4 | 1980 | 37.6 | 1981 | 37.6 | 1982 | 37.6 | 1983 | 37.6 |
| 1973 | 54.7 | 1974 | 54.7 | 1975 | 54.7 | 1976 | 54.7 | 1977 | 54.7 | 1978 | 40.2 | 1979 | 40.2 | 1980 | 37.5 | 1981 | 37.5 | 1982 | 37.5 | 1983 | 37.5 | 1984 | 37.5 |
| 1974 | 54.6 | 1975 | 54.6 | 1976 | 54.6 | 1977 | 54.6 | 1978 | 39.9 | 1979 | 39.9 | 1980 | 37.4 | 1981 | 37.4 | 1982 | 37.4 | 1983 | 37.4 | 1984 | 37.4 | 1985 | 37.4 |
| 1975 | 54.3 | 1976 | 54.3 | 1977 | 54.3 | 1978 | 39.5 | 1979 | 39.5 | 1980 | 37.2 | 1981 | 37.2 | 1982 | 37.2 | 1983 | 37.2 | 1984 | 37.2 | 1985 | 37.2 | 1986 | 37.2 |
| 1976 | 54.0 | 1977 | 54.0 | 1978 | 38.9 | 1979 | 38.9 | 1980 | 36.9 | 1981 | 36.9 | 1982 | 36.9 | 1983 | 36.9 | 1984 | 36.9 | 1985 | 36.9 | 1986 | 36.9 | 1987 | 36.9 |
| 1977 | 53.5 | 1978 | 38.2 | 1979 | 38.2 | 1980 | 36.5 | 1981 | 36.5 | 1982 | 36.5 | 1983 | 36.5 | 1984 | 36.5 | 1985 | 36.5 | 1986 | 36.5 | 1987 | 36.5 | 1988 | 36.5 |
| 1978 | 37.2 | 1979 | 37.2 | 1980 | 36.0 | 1981 | 36.0 | 1982 | 36.0 | 1983 | 36.0 | 1984 | 36.0 | 1985 | 36.0 | 1986 | 36.0 | 1987 | 36.0 | 1988 | 36.0 | 1989 | 36.0 |
| 1979 | 35.9 | 1980 | 35.3 | 1981 | 35.3 | 1982 | 35.3 | 1983 | 35.3 | 1984 | 35.3 | 1985 | 35.3 | 1986 | 35.3 | 1987 | 35.3 | 1988 | 35.3 | 1989 | 35.3 | 1990 | 35.3 |
| 1980 | 34.9 | 1981 | 34.9 | 1982 | 34.9 | 1983 | 34.9 | 1984 | 34.9 | 1985 | 34.9 | 1986 | 34.9 | 1987 | 34.9 | 1988 | 34.9 | 1989 | 34.9 | 1990 | 34.9 | 1991 | 34.9 |

January 1 of Calendar Year

| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 55.1 | 1974 | 55.1 | 1975 | 55.1 | 1976 | 55.1 | 1977 | 55.1 | 1978 | 40.7 | 1979 | 40.7 | 1980 | 37.8 | 1981 | 37.8 | 1982 | 37.8 | 1983 | 37.8 | 1984 | 37.8 |
| 1974 | 55.1 | 1975 | 55.1 | 1976 | 55.1 | 1977 | 55.1 | 1978 | 40.7 | 1979 | 40.7 | 1980 | 37.8 | 1981 | 37.8 | 1982 | 37.8 | 1983 | 37.8 | 1984 | 37.8 | 1985 | 37.8 |
| 1975 | 55.1 | 1976 | 55.1 | 1977 | 55.1 | 1978 | 40.7 | 1979 | 40.7 | 1980 | 37.8 | 1981 | 37.8 | 1982 | 37.8 | 1983 | 37.8 | 1984 | 37.8 | 1985 | 37.8 | 1986 | 37.8 |
| 1976 | 55.1 | 1977 | 55.1 | 1978 | 40.7 | 1979 | 40.7 | 1980 | 37.8 | 1981 | 37.8 | 1982 | 37.8 | 1983 | 37.8 | 1984 | 37.8 | 1985 | 37.8 | 1986 | 37.8 | 1987 | 37.8 |
| 1977 | 55.1 | 1978 | 40.7 | 1979 | 40.7 | 1980 | 37.8 | 1981 | 37.8 | 1982 | 37.8 | 1983 | 37.8 | 1984 | 37.8 | 1985 | 37.8 | 1986 | 37.8 | 1987 | 37.8 | 1988 | 37.8 |
| 1978 | 40.7 | 1979 | 40.7 | 1980 | 37.8 | 1981 | 37.8 | 1982 | 37.8 | 1983 | 37.8 | 1984 | 37.8 | 1985 | 37.8 | 1986 | 37.8 | 1987 | 37.8 | 1988 | 37.8 | 1989 | 37.8 |
| 1979 | 40.7 | 1980 | 37.8 | 1981 | 37.8 | 1982 | 37.8 | 1983 | 37.8 | 1984 | 37.8 | 1985 | 37.8 | 1986 | 37.8 | 1987 | 37.8 | 1988 | 37.8 | 1989 | 37.8 | 1990 | 37.8 |
| 1980 | 37.8 | 1981 | 37.8 | 1982 | 37.8 | 1983 | 37.8 | 1984 | 37.8 | 1985 | 37.8 | 1986 | 37.8 | 1987 | 37.8 | 1988 | 37.8 | 1989 | 37.8 | 1990 | 37.8 | 1991 | 37.8 |
| 1981 | 37.8 | 1982 | 37.8 | 1983 | 37.8 | 1984 | 37.8 | 1985 | 37.8 | 1986 | 37.8 | 1987 | 37.8 | 1988 | 37.8 | 1989 | 37.8 | 1990 | 37.8 | 1991 | 37.8 | 1992 | 37.8 |
| 1982 | 37.7 | 1983 | 37.7 | 1984 | 37.7 | 1985 | 37.7 | 1986 | 37.7 | 1987 | 37.7 | 1988 | 37.7 | 1989 | 37.7 | 1990 | 37.7 | 1991 | 37.7 | 1992 | 37.7 | 1993 | 37.7 |
| 1983 | 37.7 | 1984 | 37.7 | 1985 | 37.7 | 1986 | 37.7 | 1987 | 37.7 | 1988 | 37.7 | 1989 | 37.7 | 1990 | 37.7 | 1991 | 37.7 | 1992 | 37.7 | 1993 | 37.7 | 1994 | 37.7 |
| 1984 | 37.6 | 1985 | 37.6 | 1986 | 37.6 | 1987 | 37.6 | 1988 | 37.6 | 1989 | 37.6 | 1990 | 37.6 | 1991 | 37.6 | 1992 | 37.6 | 1993 | 37.6 | 1994 | 37.6 | 1995 | 37.6 |
| 1985 | 37.5 | 1986 | 37.5 | 1987 | 37.5 | 1988 | 37.5 | 1989 | 37.5 | 1990 | 37.5 | 1991 | 37.5 | 1992 | 37.5 | 1993 | 37.5 | 1994 | 37.5 | 1995 | 37.5 | 1996 | 37.5 |
| 1986 | 37.4 | 1987 | 37.4 | 1988 | 37.4 | 1989 | 37.4 | 1990 | 37.4 | 1991 | 37.4 | 1992 | 37.4 | 1993 | 37.4 | 1994 | 37.4 | 1995 | 37.4 | 1996 | 37.4 | 1997 | 37.4 |
| 1987 | 37.2 | 1988 | 37.2 | 1989 | 37.2 | 1990 | 37.2 | 1991 | 37.2 | 1992 | 37.2 | 1993 | 37.2 | 1994 | 37.2 | 1995 | 37.2 | 1996 | 37.2 | 1997 | 37.2 | 1998 | 37.2 |
| 1988 | 36.9 | 1989 | 36.9 | 1990 | 36.9 | 1991 | 36.9 | 1992 | 36.9 | 1993 | 36.9 | 1994 | 36.9 | 1995 | 36.9 | 1996 | 36.9 | 1997 | 36.9 | 1998 | 36.9 | 1999 | 36.9 |
| 1989 | 36.5 | 1990 | 36.5 | 1991 | 36.5 | 1992 | 36.5 | 1993 | 36.5 | 1994 | 36.5 | 1995 | 36.5 | 1996 | 36.5 | 1997 | 36.5 | 1998 | 36.5 | 1999 | 36.5 | 2000 | 36.5 |
| 1990 | 36.0 | 1991 | 36.0 | 1992 | 36.0 | 1993 | 36.0 | 1994 | 36.0 | 1995 | 36.0 | 1996 | 36.0 | 1997 | 36.0 | 1998 | 36.0 | 1999 | 36.0 | 2000 | 36.0 | 2001 | 36.0 |
| 1991 | 35.3 | 1992 | 35.3 | 1993 | 35.3 | 1994 | 35.3 | 1995 | 35.3 | 1996 | 35.3 | 1997 | 35.3 | 1998 | 35.3 | 1999 | 35.3 | 2000 | 35.3 | 2001 | 35.3 | 2002 | 35.3 |
| 1992 | 34.9 | 1993 | 34.9 | 1994 | 34.9 | 1995 | 34.9 | 1996 | 34.9 | 1997 | 34.9 | 1998 | 34.9 | 1999 | 34.9 | 2000 | 34.9 | 2001 | 34.9 | 2002 | 34.9 | 2003 | 34.9 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.8.4

TABLE 2.8.2C

DATE : MAY 25, 1985

# EXHAUST EMISSION LEVELS FOR HIGH ALTITUDE
MOTORCYCLES
NOx

January 1 of Calendar Year

| 1980 | | 1981 | | 1982 | | 1983 | | 1984 | | 1985 | | 1986 | | 1987 | | 1988 | | 1989 | | 1990 | | 1991 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1961 | 0.2 | 1962 | 0.2 | 1963 | 0.2 | 1964 | 0.2 | 1965 | 0.2 | 1966 | 0.2 | 1967 | 0.2 | 1968 | 0.2 | 1969 | 0.2 | 1970 | 0.2 | 1971 | 0.2 | 1972 | 0.2 |
| 1962 | 0.2 | 1963 | 0.2 | 1964 | 0.2 | 1965 | 0.2 | 1966 | 0.2 | 1967 | 0.2 | 1968 | 0.2 | 1969 | 0.2 | 1970 | 0.2 | 1971 | 0.2 | 1972 | 0.2 | 1973 | 0.2 |
| 1963 | 0.2 | 1964 | 0.2 | 1965 | 0.2 | 1966 | 0.2 | 1967 | 0.2 | 1968 | 0.2 | 1969 | 0.2 | 1970 | 0.2 | 1971 | 0.2 | 1972 | 0.2 | 1973 | 0.2 | 1974 | 0.2 |
| 1964 | 0.2 | 1965 | 0.2 | 1966 | 0.2 | 1967 | 0.2 | 1968 | 0.2 | 1969 | 0.2 | 1970 | 0.2 | 1971 | 0.2 | 1972 | 0.2 | 1973 | 0.2 | 1974 | 0.2 | 1975 | 0.2 |
| 1965 | 0.2 | 1966 | 0.2 | 1967 | 0.2 | 1968 | 0.2 | 1969 | 0.2 | 1970 | 0.2 | 1971 | 0.2 | 1972 | 0.2 | 1973 | 0.2 | 1974 | 0.2 | 1975 | 0.2 | 1976 | 0.2 |
| 1966 | 0.2 | 1967 | 0.2 | 1968 | 0.2 | 1969 | 0.2 | 1970 | 0.2 | 1971 | 0.2 | 1972 | 0.2 | 1973 | 0.2 | 1974 | 0.2 | 1975 | 0.2 | 1976 | 0.2 | 1977 | 0.2 |
| 1967 | 0.2 | 1968 | 0.2 | 1969 | 0.2 | 1970 | 0.2 | 1971 | 0.2 | 1972 | 0.2 | 1973 | 0.2 | 1974 | 0.2 | 1975 | 0.2 | 1976 | 0.2 | 1977 | 0.2 | 1978 | 0.4 |
| 1968 | 0.2 | 1969 | 0.2 | 1970 | 0.2 | 1971 | 0.2 | 1972 | 0.2 | 1973 | 0.2 | 1974 | 0.2 | 1975 | 0.2 | 1976 | 0.2 | 1977 | 0.2 | 1978 | 0.4 | 1979 | 0.4 |
| 1969 | 0.2 | 1970 | 0.2 | 1971 | 0.2 | 1972 | 0.2 | 1973 | 0.2 | 1974 | 0.2 | 1975 | 0.2 | 1976 | 0.2 | 1977 | 0.2 | 1978 | 0.4 | 1979 | 0.4 | 1980 | 0.6 |
| 1970 | 0.2 | 1971 | 0.2 | 1972 | 0.2 | 1973 | 0.2 | 1974 | 0.2 | 1975 | 0.2 | 1976 | 0.2 | 1977 | 0.2 | 1978 | 0.4 | 1979 | 0.4 | 1980 | 0.6 | 1981 | 0.6 |
| 1971 | 0.2 | 1972 | 0.2 | 1973 | 0.2 | 1974 | 0.2 | 1975 | 0.2 | 1976 | 0.2 | 1977 | 0.2 | 1978 | 0.4 | 1979 | 0.4 | 1980 | 0.6 | 1981 | 0.6 | 1982 | 0.6 |
| 1972 | 0.2 | 1973 | 0.2 | 1974 | 0.2 | 1975 | 0.2 | 1976 | 0.2 | 1977 | 0.2 | 1978 | 0.4 | 1979 | 0.4 | 1980 | 0.6 | 1981 | 0.6 | 1982 | 0.6 | 1983 | 0.6 |
| 1973 | 0.2 | 1974 | 0.2 | 1975 | 0.2 | 1976 | 0.2 | 1977 | 0.2 | 1978 | 0.4 | 1979 | 0.4 | 1980 | 0.6 | 1981 | 0.6 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.6 |
| 1974 | 0.2 | 1975 | 0.2 | 1976 | 0.2 | 1977 | 0.2 | 1978 | 0.4 | 1979 | 0.4 | 1980 | 0.6 | 1981 | 0.6 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 |
| 1975 | 0.2 | 1976 | 0.2 | 1977 | 0.2 | 1978 | 0.4 | 1979 | 0.4 | 1980 | 0.6 | 1981 | 0.6 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 |
| 1976 | 0.2 | 1977 | 0.2 | 1978 | 0.4 | 1979 | 0.4 | 1980 | 0.6 | 1981 | 0.6 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 |
| 1977 | 0.2 | 1978 | 0.4 | 1979 | 0.4 | 1980 | 0.6 | 1981 | 0.6 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 |
| 1978 | 0.4 | 1979 | 0.4 | 1980 | 0.6 | 1981 | 0.6 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 |
| 1979 | 0.4 | 1980 | 0.6 | 1981 | 0.6 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 |
| 1980 | 0.6 | 1981 | 0.6 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 | 1991 | 0.6 |

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| 1992 | | 1993 | | 1994 | | 1995 | | 1996 | | 1997 | | 1998 | | 1999 | | 2000 | | 2001 | | 2002 | | 2003 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** | MY* | E** |
| 1973 | 0.2 | 1974 | 0.2 | 1975 | 0.2 | 1976 | 0.2 | 1977 | 0.2 | 1978 | 0.4 | 1979 | 0.4 | 1980 | 0.6 | 1981 | 0.6 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.6 |
| 1974 | 0.2 | 1975 | 0.2 | 1976 | 0.2 | 1977 | 0.2 | 1978 | 0.4 | 1979 | 0.4 | 1980 | 0.6 | 1981 | 0.6 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 |
| 1975 | 0.2 | 1976 | 0.2 | 1977 | 0.2 | 1978 | 0.4 | 1979 | 0.4 | 1980 | 0.6 | 1981 | 0.6 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 |
| 1976 | 0.2 | 1977 | 0.2 | 1978 | 0.4 | 1979 | 0.4 | 1980 | 0.6 | 1981 | 0.6 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 |
| 1977 | 0.2 | 1978 | 0.4 | 1979 | 0.4 | 1980 | 0.6 | 1981 | 0.6 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 |
| 1978 | 0.4 | 1979 | 0.4 | 1980 | 0.6 | 1981 | 0.6 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 |
| 1979 | 0.4 | 1980 | 0.6 | 1981 | 0.6 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 |
| 1980 | 0.6 | 1981 | 0.6 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 | 1991 | 0.6 |
| 1981 | 0.6 | 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 | 1991 | 0.6 | 1992 | 0.6 |
| 1982 | 0.6 | 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 | 1991 | 0.6 | 1992 | 0.6 | 1993 | 0.6 |
| 1983 | 0.6 | 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 | 1991 | 0.6 | 1992 | 0.6 | 1993 | 0.6 | 1994 | 0.6 |
| 1984 | 0.6 | 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 | 1991 | 0.6 | 1992 | 0.6 | 1993 | 0.6 | 1994 | 0.6 | 1995 | 0.6 |
| 1985 | 0.6 | 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 | 1991 | 0.6 | 1992 | 0.6 | 1993 | 0.6 | 1994 | 0.6 | 1995 | 0.6 | 1996 | 0.6 |
| 1986 | 0.6 | 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 | 1991 | 0.6 | 1992 | 0.6 | 1993 | 0.6 | 1994 | 0.6 | 1995 | 0.6 | 1996 | 0.6 | 1997 | 0.6 |
| 1987 | 0.6 | 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 | 1991 | 0.6 | 1992 | 0.6 | 1993 | 0.6 | 1994 | 0.6 | 1995 | 0.6 | 1996 | 0.6 | 1997 | 0.6 | 1998 | 0.6 |
| 1988 | 0.6 | 1989 | 0.6 | 1990 | 0.6 | 1991 | 0.6 | 1992 | 0.6 | 1993 | 0.6 | 1994 | 0.6 | 1995 | 0.6 | 1996 | 0.6 | 1997 | 0.6 | 1998 | 0.6 | 1999 | 0.6 |
| 1989 | 0.6 | 1990 | 0.6 | 1991 | 0.6 | 1992 | 0.6 | 1993 | 0.6 | 1994 | 0.6 | 1995 | 0.6 | 1996 | 0.6 | 1997 | 0.6 | 1998 | 0.6 | 1999 | 0.6 | 2000 | 0.6 |
| 1990 | 0.6 | 1991 | 0.6 | 1992 | 0.6 | 1993 | 0.6 | 1994 | 0.6 | 1995 | 0.6 | 1996 | 0.6 | 1997 | 0.6 | 1998 | 0.6 | 1999 | 0.6 | 2000 | 0.6 | 2001 | 0.6 |
| 1991 | 0.6 | 1992 | 0.6 | 1993 | 0.6 | 1994 | 0.6 | 1995 | 0.6 | 1996 | 0.6 | 1997 | 0.6 | 1998 | 0.6 | 1999 | 0.6 | 2000 | 0.6 | 2001 | 0.6 | 2002 | 0.6 |
| 1992 | 0.6 | 1993 | 0.6 | 1994 | 0.6 | 1995 | 0.6 | 1996 | 0.6 | 1997 | 0.6 | 1998 | 0.6 | 1999 | 0.6 | 2000 | 0.6 | 2001 | 0.6 | 2002 | 0.6 | 2003 | 0.6 |

*MY -- Indicates the model year.

**E -- Indicates the average grams/mile emission level for model year "MY" on January 1 of the given calendar year. These emission levels are calculated for the basic test conditions: 19.6 MPH, TEMP=75 Degrees F, 20.6% of VMT traveled in cold start, 52.1% of VMT in stabilized, and 27.3% of VMT in a hot start. Emissions are based on the January 1 mileage accumulation figures given in Table 2.8.4.

## TABLE 2.8.3

## IDLE EMISSION RATES FOR HIGH ALTITUDE MOTORCYCLES

* IER = ZML + (DR * M)

| Pol | Model Years | Zero Mile Emission Level (Grams/Min.) | Deterioration Rate (Gm/Min/10K Mi) |
|---|---|---|---|
| HC | Pre-1978 | 2.41 | 0.42 |
| | 1978-1979 | 0.53 | 0.36 |
| | 1980+ | 0.78 | 0.38 |
| CO | Pre-1978 | 5.03 | 0.23 |
| | 1978-1979 | 2.34 | 0.50 |
| | 1980+ | 2.56 | 0.26 |
| NOx | Pre-1978 | 0.01 | 0.0 |
| | 1978-1979 | 0.02 | 0.0 |
| | 1980+ | 0.02 | 0.0 |

* WHERE : IER = Idle emission rate
ZML = Zero mile level
DR = Deterioration Rate
M = Cumulative Mileage / 10,000

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## TABLE 2.8.4

## REGISTRATION MIX AND MILEAGE ACCUMULATION RATES FOR HIGH ALTITUDE MOTORCYCLES

| Model Year Index** | July 1 Registration Mix* | Mileage Accumulation Rate per vehicle* | Jan 1 Registration Mix | Jan 1 Mileage Accumulation Rate (fleet) | Jan 1 Mileage Accumulation (fleet) |
|---|---|---|---|---|---|
| 1 | 0.133 | 4100. | 0.044 | 0. | 0. |
| 2 | 0.145 | 2800. | 0.145 | 4100. | 2050. |
| 3 | 0.138 | 2100. | 0.138 | 2800. | 5500. |
| 4 | 0.116 | 1600. | 0.116 | 2100. | 7950. |
| 5 | 0.123 | 1200. | 0.123 | 1600. | 9800. |
| 6 | 0.114 | 800. | 0.114 | 1200. | 11200. |
| 7 | 0.069 | 600. | 0.069 | 800. | 12200. |
| 8 | 0.044 | 400. | 0.044 | 600. | 12900. |
| 9 | 0.024 | 200. | 0.024 | 400. | 13400. |
| 10 | 0.009 | 200. | 0.009 | 200. | 13700. |
| 11 | 0.085 | 200. | 0.085 | 200. | 13900. |
| 12 | 0.0 | 0. | 0.0 | 200. | 14100. |
| 13 | 0.0 | 0. | 0.0 | 0. | 14200. |
| 14 | 0.0 | 0. | 0.0 | 0. | 14200. |
| 15 | 0.0 | 0. | 0.0 | 0. | 14200. |
| 16 | 0.0 | 0. | 0.0 | 0. | 14200. |
| 17 | 0.0 | 0. | 0.0 | 0. | 14200. |
| 18 | 0.0 | 0. | 0.0 | 0. | 14200. |
| 19 | 0.0 | 0. | 0.0 | 0. | 14200. |
| 20+ | 0.0 | 0. | 0.0 | 0. | 14200. |

* Default information that may be altered by the MOBILE3 user with information about the local area.

** The indices refer to the most recent model year vehicles in any given calendar year. Index 1 references the newest model year vehicles and index 20+ references the oldest model year vehicles.

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## TABLE 2.8.5

## EXAMPLE TRAVEL WEIGHTING FRACTION CALCULATION FOR HIGH ALTITUDE MOTORCYCLES JANUARY 1, 1988

| Model Years | (A) MC Fleet Registration | (B) Sales Fraction | (A*B) | (C=A*B/DAF) MC Registration | (D) Annual Mileage Accrual Rate | (C*D) | (C*D/TFNORM) Travel Fractions |
|---|---|---|---|---|---|---|---|
| 1988 | 0.044 | 1.000 | 0.044 | 0.0 | 0. | 0.0 | 0.0 |
| 1987 | 0.145 | 1.000 | 0.145 | 0.167 | 4100. | 685.7 | 0.356 |
| 1986 | 0.138 | 1.000 | 0.138 | 0.159 | 2800. | 445.7 | 0.232 |
| 1985 | 0.116 | 1.000 | 0.116 | 0.134 | 2100. | 281.0 | 0.146 |
| 1984 | 0.123 | 1.000 | 0.123 | 0.142 | 1600. | 227.0 | 0.118 |
| 1983 | 0.114 | 1.000 | 0.114 | 0.131 | 1200. | 157.8 | 0.082 |
| 1982 | 0.069 | 1.000 | 0.069 | 0.080 | 800. | 63.7 | 0.033 |
| 1981 | 0.044 | 1.000 | 0.044 | 0.051 | 600. | 30.4 | 0.016 |
| 1980 | 0.024 | 1.000 | 0.024 | 0.028 | 400. | 11.1 | 0.006 |
| 1979 | 0.009 | 1.000 | 0.009 | 0.010 | 200. | 2.1 | 0.001 |
| 1978 | 0.085 | 1.000 | 0.085 | 0.098 | 200. | 19.6 | 0.010 |
| 1977 | 0.0 | 1.000 | 0.0 | 0.0 | 200. | 0.0 | 0.0 |
| 1976 | 0.0 | 1.000 | 0.0 | 0.0 | 0. | 0.0 | 0.0 |
| 1975 | 0.0 | 1.000 | 0.0 | 0.0 | 0. | 0.0 | 0.0 |
| 1974 | 0.0 | 1.000 | 0.0 | 0.0 | 0. | 0.0 | 0.0 |
| 1973 | 0.0 | 1.000 | 0.0 | 0.0 | 0. | 0.0 | 0.0 |
| 1972 | 0.0 | 1.000 | 0.0 | 0.0 | 0. | 0.0 | 0.0 |
| 1971 | 0.0 | 1.000 | 0.0 | 0.0 | 0. | 0.0 | 0.0 |
| 1970 | 0.0 | 1.000 | 0.0 | 0.0 | 0. | 0.0 | 0.0 |
| 1969- | 0.0 | 1.000 | 0.0 | 0.0 | 0. | 0.0 | 0.0 |

DAF: 0.911

TFNORM: 1924.0

WHERE :

A = January 1 registration mix from Table 2.8.4.
B = Fleet sales fractions
D = Sales weighted fleet mileage accumulation rate from Table 2.8.4, adjusted to January 1
D(1) = Annual Miles(1)
D(MYI) = .25*(Annual Miles(MYI)) + .75*(Annual Miles(MYI-1)), MYI=2,...,20+

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## TABLE 2.8.6

## SPEED CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE MOTORCYCLES

$$* \ SCF(s,sadj) = SF(s)/SF(sadj)$$

$$SF(s) = EXP(A + B*s + C*s^2 + D*S^3 + E*s^4 + F*s^5), \text{ HC \& CO}$$
$$= A + B*s + C*s^2 + D*s^3 + E*s^4 + F*s^5 , \text{ NOx}$$

| Pollutant and Model Years | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| HC | | | | | | |
| Pre-1978 | 0.224612E+01 | -0.290973E+00 | 0.158890E-01 | -0.472494E-03 | 0.694077E-05 | -0.392798E-07 |
| 1978-1979 | 0.215056E+01 | -0.283620E+00 | 0.153836E-01 | -0.442136E-03 | 0.628732E-05 | -0.346311E-07 |
| 1980+ | 0.212230E+01 | -0.291072E+00 | 0.169089E-01 | -0.526148E-03 | 0.802705E-05 | -0.470117E-07 |
| CO | | | | | | |
| Pre-1978 | 0.181978E+01 | -0.254663E+00 | 0.152347E-01 | -0.487397E-03 | 0.758207E-05 | -0.449514E-07 |
| 1978-1979 | 0.182133E+01 | -0.272054E+00 | 0.170304E-01 | -0.552021E-03 | 0.862543E-05 | -0.511440E-07 |
| 1980+ | 0.204533E+01 | -0.310618E+00 | 0.204852E-01 | -0.708527E-03 | 0.116215E-04 | -0.715690E-07 |
| NOx | | | | | | |
| Pre-1978 | 0.244424E+01 | -0.250107E+00 | 0.138293E-01 | -0.287025E-03 | 0.207585E-05 | 0.0 |
| 1978+ | 0.144825E+01 | -0.122444E+00 | 0.795024E-02 | -0.171078E-03 | 0.125777E-05 | 0.0 |

* WHERE : s = average speed (mph)
sadj = basic test procedure speed; adjusted for fraction of cold start operation x and fraction of hot start operation w, [ 1/sadj = (w+x)/26 + (1-w-x)/16 ]

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## TABLE 2.8.7A

## TEMPERATURE CORRECTION FACTOR COEFFICIENTS FOR HIGH ALTITUDE MOTORCYCLES

* TCF(b) = EXP( TC(b) * (T - 75.0))

| Pol | Model Years | Test segment 1 |  | Test segment 2 |  | Test segment 3 |  |
|---|---|---|---|---|---|---|---|
|  |  | TC Low | TC High | TC Low | TC High | TC Low | TC High |
| HC | Pre-1978 | -0.20623E-01 | -0.14381E-01 | -0.24032E-02 | 0.13219E-02 | -0.10081E-02 | 0.34799E-02 |
|  | 1978-1979 | -0.24462E-01 | -0.12552E-01 | -0.32017E-02 | 0.42667E-02 | -0.86884E-03 | 0.75843E-02 |
|  | 1980+ | -0.21255E-01 | -0.10888E-01 | -0.52755E-03 | -0.47925E-03 | 0.93659E-03 | 0.76666E-02 |
| CO | Pre-1978 | -0.13487E-01 | -0.14691E-01 | 0.15784E-02 | 0.37462E-02 | 0.11097E-02 | 0.11014E-01 |
|  | 1978-1979 | -0.21126E-01 | -0.38767E-01 | -0.15289E-02 | 0.84685E-02 | 0.15749E-02 | 0.25179E-01 |
|  | 1980+ | -0.20843E-01 | -0.21165E-01 | -0.59951E-02 | 0.23603E-01 | 0.18253E-02 | 0.28483E-01 |
| NOx | Pre-1978 | -0.16897E-03 | 0.38841E-02 | -0.89245E-02 | -0.87325E-02 | -0.72580E-02 | -0.10839E-01 |
|  | 1978+ | -0.25074E-03 | -0.10389E-02 | -0.59791E-02 | -0.92466E-02 | -0.62690E-02 | -0.10108E-01 |

* WHERE :

TCF(b) = Temperature correction factor for appropriate pollutant, ambient temperature, and model year; for test segment b
T = Ambient temperature (Fahrenheit)
TC(b) = Temperature correction factor coefficient for appropriate pollutant, reference temperature and model year; for test segment b
75.0 = Reference temperature

NOTE : The temperature correction factor is used in conjunction with the Ripstwxn correction factor given in Table 2.8.7B.

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## TABLE 2.8.7B

## NORMALIZED BAG FRACTIONS FOR HIGH ALTITUDE MOTORCYCLES

| | | Normalized Fractions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Model | Test Seg.#1 | | Test Seg.#2 | | Test Seg.#3 | | Total Test | |
| Pol | Years | B1 | D1 | B2 | D2 | B3 | D3 | B0 | D0 |
| HC | Pre-1978 | 1.282 | 0.025 | 0.973 | 0.028 | 0.839 | 0.019 | 1.000 | 0.025 |
| | 1978-1979 | 1.345 | 0.074 | 0.946 | 0.054 | 0.842 | 0.048 | 1.000 | 0.056 |
| | 1980+ | 1.345 | 0.178 | 0.919 | 0.118 | 0.894 | 0.093 | 1.000 | 0.124 |
| CO | Pre-1978 | 1.277 | 0.033 | 1.017 | 0.029 | 0.758 | 0.025 | 1.000 | 0.029 |
| | 1978-1979 | 1.442 | 0.071 | 0.996 | 0.042 | 0.674 | 0.033 | 1.000 | 0.046 |
| | 1980+ | 1.553 | 0.109 | 0.933 | 0.079 | 0.711 | 0.038 | 1.000 | 0.074 |
| NOx | Pre-1978 | 1.121 | 0.009 | 0.785 | 0.001 | 1.319 | -0.009 | 1.000 | 0.0 |
| | 1978+ | 1.199 | -0.004 | 0.793 | -0.002 | 1.245 | 0.006 | 1.000 | 0.0 |

NOTE : The fractions given in this table are used in the calculation of the operating-mode/ temperature correction factor (OMTCF).

WHERE : OMTCF = ((TERM1 + TERM2 + TERM3)/DENOM)
TERM1 = W *TCF(1)*(B1+D1*M)
TERM2 = (1-W-X)*TCF(2)*(B2+D2*M)
TERM3 = X *TCF(3)*(B3+D3*M)
DENOM = B0 + D0*M
W = Fraction of VMT in the cold start mode
X = Fraction of VMT in the hot start mode
TCF(b) = Temperature correction factor for pollutant, model year; for test segment b
M = Cumulative mileage / 10,000

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## Appendix I

## EMISSION SENSITIVITY TABLES - ALL VEHICLES COMBINED

This appendix contains average emission factors for all mobile sources combined for several calendar years between 1980 and 2000, for various ambient temperatures, cold/hot start VMT weightings, and for a range of average speed combinations. This appendix includes one case that represents the average national emission factors as generated from the standard test conditions (in Tables 3, 9, and 15 for HC, CO, and NOx; respectively) as well as other scenarios that can be used to assess the sensitivity of the emission factors to changing input conditions. All emission factors are given in units of grams of pollutant per vehicle mile traveled. The hydrocarbon emission levels include the crankcase and evaporative HC emission results. Further, the hydrocarbon emissions are total, rather than nonmethane.

Emission factors presented in this section are intended to assist those individuals interested in compiling approximate mobile source emission estimates for large areas, such as an individual air quality region or the entire nation.

The emission factor calculation techniques presented in this document are strongly recommended for the formulation of localized emission estimates required for air quality modeling or for the evaluation of air pollutant control strategies. Many factors, which vary with geographic location and estimation situation, can affect emission estimates considerably. The factors of concern include average speed, percentage of VMT in cold/hot start vehicle operation, percentage of travel by vehicle type, ambient temperature, air conditioning usage, vehicle load, trailer towing, and humidity. Clearly, the innumerable combinations make it impossible to present mobile source emission factors for each application. An effort has been made, therefore, to present emission factors for a range of conditions. The following conditions are considered for each of these cases:

1. Each table represents one average speed. There are 6 basic tables with speeds of 5.0, 10.0, 19.6, 35.0, 50.0, and 55.0 mph.

2. Each table presents six calendar years: 1980, 1985, 1988, 1990, 1995, and 2000.

3. Each calendar year presents 35 combinations of five temperatures and seven operating modes. The five temperatures are 0°, 25°, 50°, 75°, and 100°F. The seven operating mode combinations are shown in the following Table.

Operating Mode Combinations

| MOBILE3 Input | Description |
|---|---|
| 0/0/0 | 100% Stabilized |
| 0/100/0 | 100% Hot Start |
| 100/0/100 | 100% Cold Start |
| 50/0/50 | 50% Cold Start, 50% Stabilized |
| 0/50/0 | 50% Hot Start, 50% Stabilized |
| 50/50/50 | 50% Cold Start, 50% Hot Start |
| 20.6/27.3/20.6 | 20.6% Cold Start, 52.1% Stabilized, 27.3% Hot Start |

---

NOTES: All percentages are percent of VMT accumulated in that mode.

4. The VMT mixes are those calculated from MOBILE3. They are as follows:

| Calendar Year | LDGV | LDGT1 | LDGT2 | HDGV | LDDV | LDDT | HDDV | MC |
|---|---|---|---|---|---|---|---|---|
| 1980 | 0.666 | 0.133 | 0.088 | 0.040 | 0.005 | 0.001 | 0.060 | 0.007 |
| 1985 | 0.652 | 0.128 | 0.087 | 0.040 | 0.023 | 0.008 | 0.054 | 0.007 |
| 1987 | 0.647 | 0.124 | 0.087 | 0.040 | 0.031 | 0.012 | 0.051 | 0.007 |
| 1990 | 0.635 | 0.115 | 0.086 | 0.041 | 0.046 | 0.021 | 0.049 | 0.007 |
| 1995 | 0.617 | 0.102 | 0.086 | 0.041 | 0.067 | 0.035 | 0.045 | 0.007 |
| 2000 | 0.608 | 0.095 | 0.087 | 0.041 | 0.076 | 0.042 | 0.044 | 0.007 |

## TABLE 1

## LOW ALTITUDE

## THC EMISSION FACTORS (GRAMS/MILE) AT 5.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | Combined for Eight Vehicle Types @ Ambient Temperature 0 F | 25 F | 50 F | 75 F | 100 F |
|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 18.17 | 16.71 | 15.48 | 14.43 | 17.09 |
| 1980 | 0.0 | 100.0 | 0.0 | 18.12 | 17.96 | 17.88 | 17.88 | 23.21 |
| 1980 | 100.0 | 0.0 | 100.0 | 124.47 | 72.94 | 43.50 | 26.63 | 21.18 |
| 1980 | 50.0 | 0.0 | 50.0 | 59.90 | 38.74 | 26.40 | 19.13 | 18.56 |
| 1980 | 0.0 | 50.0 | 0.0 | 18.02 | 17.08 | 16.31 | 15.69 | 19.34 |
| 1980 | 50.0 | 50.0 | 50.0 | 71.29 | 45.45 | 30.69 | 22.26 | 22.19 |
| 1980 | 20.6 | 27.3 | 20.6 | 35.13 | 25.91 | 20.39 | 17.03 | 18.91 |
| 1985 | 0.0 | 0.0 | 0.0 | 12.20 | 10.78 | 9.62 | 8.68 | 11.56 |
| 1985 | 0.0 | 100.0 | 0.0 | 12.06 | 11.63 | 11.30 | 11.05 | 15.70 |
| 1985 | 100.0 | 0.0 | 100.0 | 91.77 | 50.78 | 28.89 | 17.05 | 14.17 |
| 1985 | 50.0 | 0.0 | 50.0 | 42.60 | 26.02 | 16.92 | 11.81 | 12.44 |
| 1985 | 0.0 | 50.0 | 0.0 | 12.00 | 10.99 | 10.17 | 9.51 | 13.01 |
| 1985 | 50.0 | 50.0 | 50.0 | 51.91 | 31.21 | 20.10 | 14.05 | 14.94 |
| 1985 | 20.6 | 27.3 | 20.6 | 24.50 | 17.11 | 12.89 | 10.40 | 12.70 |
| 1988 | 0.0 | 0.0 | 0.0 | 9.47 | 8.13 | 7.06 | 6.21 | 8.53 |
| 1988 | 0.0 | 100.0 | 0.0 | 9.67 | 9.01 | 8.47 | 8.04 | 11.66 |
| 1988 | 100.0 | 0.0 | 100.0 | 81.01 | 42.33 | 22.87 | 12.92 | 11.40 |
| 1988 | 50.0 | 0.0 | 50.0 | 36.58 | 21.05 | 12.99 | 8.69 | 9.53 |
| 1988 | 0.0 | 50.0 | 0.0 | 9.42 | 8.36 | 7.51 | 6.83 | 9.60 |
| 1988 | 50.0 | 50.0 | 50.0 | 45.34 | 25.67 | 15.67 | 10.48 | 11.53 |
| 1988 | 20.6 | 27.3 | 20.6 | 20.51 | 13.52 | 9.73 | 7.56 | 9.51 |
| 1990 | 0.0 | 0.0 | 0.0 | 7.98 | 6.75 | 5.78 | 5.01 | 6.80 |
| 1990 | 0.0 | 100.0 | 0.0 | 8.35 | 7.61 | 7.00 | 6.50 | 9.32 |
| 1990 | 100.0 | 0.0 | 100.0 | 75.30 | 37.79 | 19.67 | 10.76 | 10.11 |
| 1990 | 50.0 | 0.0 | 50.0 | 33.49 | 18.47 | 10.98 | 7.13 | 7.99 |
| 1990 | 0.0 | 50.0 | 0.0 | 8.01 | 6.99 | 6.17 | 5.51 | 7.67 |
| 1990 | 50.0 | 50.0 | 50.0 | 41.83 | 22.70 | 13.33 | 8.63 | 9.72 |
| 1990 | 20.6 | 27.3 | 20.6 | 18.40 | 11.66 | 8.11 | 6.14 | 7.75 |
| 1995 | 0.0 | 0.0 | 0.0 | 5.64 | 4.67 | 3.92 | 3.32 | 4.02 |
| 1995 | 0.0 | 100.0 | 0.0 | 6.28 | 5.46 | 4.78 | 4.23 | 5.56 |
| 1995 | 100.0 | 0.0 | 100.0 | 64.59 | 29.99 | 14.44 | 7.37 | 8.19 |
| 1995 | 50.0 | 0.0 | 50.0 | 28.14 | 14.29 | 7.89 | 4.83 | 5.58 |
| 1995 | 0.0 | 50.0 | 0.0 | 5.81 | 4.91 | 4.20 | 3.63 | 4.56 |
| 1995 | 50.0 | 50.0 | 50.0 | 35.43 | 17.72 | 9.61 | 5.80 | 6.88 |
| 1995 | 20.6 | 27.3 | 20.6 | 14.91 | 8.73 | 5.69 | 4.10 | 4.95 |
| 2000 | 0.0 | 0.0 | 0.0 | 4.72 | 3.89 | 3.25 | 2.75 | 2.95 |
| 2000 | 0.0 | 100.0 | 0.0 | 5.40 | 4.60 | 3.95 | 3.42 | 4.11 |
| 2000 | 100.0 | 0.0 | 100.0 | 58.62 | 26.27 | 12.19 | 6.02 | 7.40 |
| 2000 | 50.0 | 0.0 | 50.0 | 25.44 | 12.47 | 6.66 | 3.98 | 4.64 |
| 2000 | 0.0 | 50.0 | 0.0 | 4.91 | 4.11 | 3.48 | 2.98 | 3.36 |
| 2000 | 50.0 | 50.0 | 50.0 | 32.01 | 15.44 | 8.07 | 4.72 | 5.75 |
| 2000 | 20.6 | 27.3 | 20.6 | 13.28 | 7.51 | 4.76 | 3.37 | 3.86 |

TABLE 1 : THC AT 5.0 MPH.

## TABLE 2

## LOW ALTITUDE

## THC EMISSION FACTORS (GRAMS/MILE) AT 10.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types @ Ambient Temperature | | | | |
|---|---|---|---|---|---|---|---|---|
| | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 11.30 | 10.45 | 9.73 | 9.13 | 10.67 |
| 1980 | 0.0 | 100.0 | 0.0 | 11.25 | 11.12 | 11.03 | 10.99 | 13.95 |
| 1980 | 100.0 | 0.0 | 100.0 | 68.58 | 40.73 | 24.84 | 15.74 | 12.79 |
| 1980 | 50.0 | 0.0 | 50.0 | 33.75 | 22.29 | 15.61 | 11.67 | 11.43 |
| 1980 | 0.0 | 50.0 | 0.0 | 11.20 | 10.64 | 10.18 | 9.80 | 11.87 |
| 1980 | 50.0 | 50.0 | 50.0 | 39.92 | 25.92 | 17.93 | 13.36 | 13.37 |
| 1980 | 20.6 | 27.3 | 20.6 | 20.42 | 15.39 | 12.38 | 10.53 | 11.63 |
| 1985 | 0.0 | 0.0 | 0.0 | 8.02 | 7.12 | 6.39 | 5.80 | 7.59 |
| 1985 | 0.0 | 100.0 | 0.0 | 8.00 | 7.68 | 7.43 | 7.23 | 10.06 |
| 1985 | 100.0 | 0.0 | 100.0 | 56.91 | 31.42 | 18.00 | 10.84 | 9.24 |
| 1985 | 50.0 | 0.0 | 50.0 | 26.64 | 16.35 | 10.77 | 7.67 | 8.15 |
| 1985 | 0.0 | 50.0 | 0.0 | 7.93 | 7.26 | 6.73 | 6.29 | 8.45 |
| 1985 | 50.0 | 50.0 | 50.0 | 32.45 | 19.55 | 12.71 | 9.03 | 9.65 |
| 1985 | 20.6 | 27.3 | 20.6 | 15.57 | 10.96 | 8.36 | 6.83 | 8.28 |
| 1988 | 0.0 | 0.0 | 0.0 | 6.48 | 5.59 | 4.88 | 4.31 | 5.79 |
| 1988 | 0.0 | 100.0 | 0.0 | 6.68 | 6.20 | 5.81 | 5.48 | 7.78 |
| 1988 | 100.0 | 0.0 | 100.0 | 54.16 | 28.06 | 15.15 | 8.65 | 7.84 |
| 1988 | 50.0 | 0.0 | 50.0 | 24.52 | 14.06 | 8.72 | 5.91 | 6.52 |
| 1988 | 0.0 | 50.0 | 0.0 | 6.48 | 5.76 | 5.18 | 4.71 | 6.47 |
| 1988 | 50.0 | 50.0 | 50.0 | 30.42 | 17.13 | 10.48 | 7.06 | 7.81 |
| 1988 | 20.6 | 27.3 | 20.6 | 13.84 | 9.13 | 6.61 | 5.18 | 6.45 |
| 1990 | 0.0 | 0.0 | 0.0 | 5.63 | 4.79 | 4.12 | 3.60 | 4.76 |
| 1990 | 0.0 | 100.0 | 0.0 | 5.95 | 5.41 | 4.96 | 4.59 | 6.43 |
| 1990 | 100.0 | 0.0 | 100.0 | 52.66 | 26.19 | 13.59 | 7.48 | 7.22 |
| 1990 | 50.0 | 0.0 | 50.0 | 23.45 | 12.86 | 7.67 | 5.03 | 5.65 |
| 1990 | 0.0 | 50.0 | 0.0 | 5.68 | 4.97 | 4.39 | 3.93 | 5.33 |
| 1990 | 50.0 | 50.0 | 50.0 | 29.30 | 15.80 | 9.27 | 6.04 | 6.83 |
| 1990 | 20.6 | 27.3 | 20.6 | 12.93 | 8.18 | 5.71 | 4.36 | 5.43 |
| 1995 | 0.0 | 0.0 | 0.0 | 4.26 | 3.55 | 3.00 | 2.57 | 3.04 |
| 1995 | 0.0 | 100.0 | 0.0 | 4.75 | 4.14 | 3.64 | 3.23 | 4.16 |
| 1995 | 100.0 | 0.0 | 100.0 | 48.38 | 22.39 | 10.78 | 5.55 | 6.24 |
| 1995 | 50.0 | 0.0 | 50.0 | 21.11 | 10.72 | 5.94 | 3.68 | 4.24 |
| 1995 | 0.0 | 50.0 | 0.0 | 4.39 | 3.73 | 3.21 | 2.79 | 3.43 |
| 1995 | 50.0 | 50.0 | 50.0 | 26.56 | 13.26 | 7.21 | 4.39 | 5.20 |
| 1995 | 20.6 | 27.3 | 20.6 | 11.21 | 6.57 | 4.31 | 3.14 | 3.74 |
| 2000 | 0.0 | 0.0 | 0.0 | 3.67 | 3.05 | 2.57 | 2.19 | 2.33 |
| 2000 | 0.0 | 100.0 | 0.0 | 4.19 | 3.59 | 3.10 | 2.70 | 3.21 |
| 2000 | 100.0 | 0.0 | 100.0 | 44.93 | 20.15 | 9.38 | 4.68 | 5.75 |
| 2000 | 50.0 | 0.0 | 50.0 | 19.53 | 9.60 | 5.17 | 3.13 | 3.63 |
| 2000 | 0.0 | 50.0 | 0.0 | 3.82 | 3.22 | 2.74 | 2.36 | 2.64 |
| 2000 | 50.0 | 50.0 | 50.0 | 24.56 | 11.87 | 6.24 | 3.69 | 4.48 |
| 2000 | 20.6 | 27.3 | 20.6 | 10.23 | 5.82 | 3.72 | 2.67 | 3.03 |

TABLE 2 : THC AT 10.0 MPH.

## TABLE 3

## LOW ALTITUDE

## THC EMISSION FACTORS (GRAMS/MILE) AT 19.6 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | Combined for Eight Vehicle Types @ Ambient Temperature 0 F | 25 F | 50 F | 75 F | 100 F |
|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 7.44 | 6.97 | 6.56 | 6.22 | 7.11 |
| 1980 | 0.0 | 100.0 | 0.0 | 7.40 | 7.33 | 7.28 | 7.26 | 8.93 |
| 1980 | 100.0 | 0.0 | 100.0 | 39.70 | 24.01 | 15.06 | 9.94 | 8.27 |
| 1980 | 50.0 | 0.0 | 50.0 | 20.09 | 13.64 | 9.87 | 7.65 | 7.52 |
| 1980 | 0.0 | 50.0 | 0.0 | 7.39 | 7.07 | 6.81 | 6.60 | 7.78 |
| 1980 | 50.0 | 50.0 | 50.0 | 23.55 | 15.67 | 11.17 | 8.60 | 8.60 |
| 1980 | 20.6 | 27.3 | 20.6 | 12.58 | 9.75 | 8.05 | 7.01 | 7.64 |
| 1985 | 0.0 | 0.0 | 0.0 | 5.23 | 4.71 | 4.29 | 3.95 | 4.98 |
| 1985 | 0.0 | 100.0 | 0.0 | 5.21 | 5.03 | 4.88 | 4.77 | 6.37 |
| 1985 | 100.0 | 0.0 | 100.0 | 33.51 | 18.70 | 10.96 | 6.84 | 5.95 |
| 1985 | 50.0 | 0.0 | 50.0 | 16.01 | 10.03 | 6.81 | 5.03 | 5.31 |
| 1985 | 0.0 | 50.0 | 0.0 | 5.17 | 4.79 | 4.48 | 4.24 | 5.46 |
| 1985 | 50.0 | 50.0 | 50.0 | 19.36 | 11.87 | 7.92 | 5.80 | 6.16 |
| 1985 | 20.6 | 27.3 | 20.6 | 9.60 | 6.93 | 5.42 | 4.54 | 5.37 |
| 1988 | 0.0 | 0.0 | 0.0 | 4.19 | 3.68 | 3.26 | 2.94 | 3.78 |
| 1988 | 0.0 | 100.0 | 0.0 | 4.31 | 4.03 | 3.80 | 3.61 | 4.92 |
| 1988 | 100.0 | 0.0 | 100.0 | 32.42 | 16.89 | 9.27 | 5.46 | 5.04 |
| 1988 | 50.0 | 0.0 | 50.0 | 14.89 | 8.66 | 5.52 | 3.87 | 4.23 |
| 1988 | 0.0 | 50.0 | 0.0 | 4.19 | 3.77 | 3.44 | 3.17 | 4.17 |
| 1988 | 50.0 | 50.0 | 50.0 | 18.37 | 10.46 | 6.54 | 4.54 | 4.98 |
| 1988 | 20.6 | 27.3 | 20.6 | 8.55 | 5.76 | 4.28 | 3.44 | 4.17 |
| 1990 | 0.0 | 0.0 | 0.0 | 3.66 | 3.16 | 2.77 | 2.46 | 3.12 |
| 1990 | 0.0 | 100.0 | 0.0 | 3.86 | 3.53 | 3.27 | 3.05 | 4.10 |
| 1990 | 100.0 | 0.0 | 100.0 | 32.00 | 15.98 | 8.41 | 4.77 | 4.67 |
| 1990 | 50.0 | 0.0 | 50.0 | 14.41 | 8.01 | 4.89 | 3.32 | 3.69 |
| 1990 | 0.0 | 50.0 | 0.0 | 3.69 | 3.27 | 2.93 | 2.66 | 3.46 |
| 1990 | 50.0 | 50.0 | 50.0 | 17.93 | 9.76 | 5.84 | 3.91 | 4.39 |
| 1990 | 20.6 | 27.3 | 20.6 | 8.06 | 5.20 | 3.72 | 2.92 | 3.53 |
| 1995 | 0.0 | 0.0 | 0.0 | 2.82 | 2.40 | 2.07 | 1.81 | 2.07 |
| 1995 | 0.0 | 100.0 | 0.0 | 3.13 | 2.76 | 2.46 | 2.21 | 2.75 |
| 1995 | 100.0 | 0.0 | 100.0 | 30.31 | 14.09 | 6.87 | 3.64 | 4.10 |
| 1995 | 50.0 | 0.0 | 50.0 | 13.33 | 6.85 | 3.88 | 2.49 | 2.83 |
| 1995 | 0.0 | 50.0 | 0.0 | 2.91 | 2.51 | 2.19 | 1.94 | 2.31 |
| 1995 | 50.0 | 50.0 | 50.0 | 16.72 | 8.42 | 4.66 | 2.92 | 3.42 |
| 1995 | 20.6 | 27.3 | 20.6 | 7.16 | 4.27 | 2.88 | 2.16 | 2.51 |
| 2000 | 0.0 | 0.0 | 0.0 | 2.48 | 2.10 | 1.80 | 1.57 | 1.65 |
| 2000 | 0.0 | 100.0 | 0.0 | 2.80 | 2.44 | 2.14 | 1.89 | 2.20 |
| 2000 | 100.0 | 0.0 | 100.0 | 28.60 | 12.91 | 6.10 | 3.14 | 3.82 |
| 2000 | 50.0 | 0.0 | 50.0 | 12.52 | 6.24 | 3.44 | 2.16 | 2.47 |
| 2000 | 0.0 | 50.0 | 0.0 | 2.57 | 2.20 | 1.91 | 1.68 | 1.84 |
| 2000 | 50.0 | 50.0 | 50.0 | 15.70 | 7.67 | 4.12 | 2.52 | 3.01 |
| 2000 | 20.6 | 27.3 | 20.6 | 6.63 | 3.85 | 2.53 | 1.87 | 2.09 |

TABLE 3 : THC AT 19.6 MPH.

## TABLE 4

## LOW ALTITUDE

## THC EMISSION FACTORS (GRAMS/MILE) AT 35.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types @ Ambient Temperature | | | | |
|---|---|---|---|---|---|---|---|---|
| | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 5.30 | 5.05 | 4.83 | 4.65 | 5.12 |
| 1980 | 0.0 | 100.0 | 0.0 | 5.29 | 5.26 | 5.24 | 5.23 | 6.14 |
| 1980 | 100.0 | 0.0 | 100.0 | 23.91 | 14.88 | 9.72 | 6.77 | 5.79 |
| 1980 | 50.0 | 0.0 | 50.0 | 12.64 | 8.92 | 6.75 | 5.47 | 5.36 |
| 1980 | 0.0 | 50.0 | 0.0 | 5.28 | 5.11 | 4.97 | 4.86 | 5.50 |
| 1980 | 50.0 | 50.0 | 50.0 | 14.60 | 10.07 | 7.48 | 6.00 | 5.97 |
| 1980 | 20.6 | 27.3 | 20.6 | 8.28 | 6.66 | 5.69 | 5.10 | 5.42 |
| 1985 | 0.0 | 0.0 | 0.0 | 3.51 | 3.24 | 3.02 | 2.85 | 3.37 |
| 1985 | 0.0 | 100.0 | 0.0 | 3.50 | 3.41 | 3.34 | 3.28 | 4.12 |
| 1985 | 100.0 | 0.0 | 100.0 | 18.81 | 10.81 | 6.63 | 4.40 | 3.92 |
| 1985 | 50.0 | 0.0 | 50.0 | 9.36 | 6.13 | 4.39 | 3.43 | 3.56 |
| 1985 | 0.0 | 50.0 | 0.0 | 3.48 | 3.28 | 3.13 | 3.00 | 3.63 |
| 1985 | 50.0 | 50.0 | 50.0 | 11.15 | 7.11 | 4.98 | 3.84 | 4.02 |
| 1985 | 20.6 | 27.3 | 20.6 | 5.88 | 4.44 | 3.64 | 3.17 | 3.59 |
| 1988 | 0.0 | 0.0 | 0.0 | 2.71 | 2.45 | 2.24 | 2.07 | 2.49 |
| 1988 | 0.0 | 100.0 | 0.0 | 2.78 | 2.64 | 2.52 | 2.42 | 3.09 |
| 1988 | 100.0 | 0.0 | 100.0 | 17.79 | 9.49 | 5.43 | 3.40 | 3.19 |
| 1988 | 50.0 | 0.0 | 50.0 | 8.44 | 5.12 | 3.44 | 2.56 | 2.74 |
| 1988 | 0.0 | 50.0 | 0.0 | 2.71 | 2.50 | 2.33 | 2.19 | 2.70 |
| 1988 | 50.0 | 50.0 | 50.0 | 10.29 | 6.07 | 3.97 | 2.91 | 3.14 |
| 1988 | 20.6 | 27.3 | 20.6 | 5.05 | 3.56 | 2.77 | 2.33 | 2.71 |
| 1990 | 0.0 | 0.0 | 0.0 | 2.34 | 2.09 | 1.88 | 1.72 | 2.05 |
| 1990 | 0.0 | 100.0 | 0.0 | 2.45 | 2.28 | 2.14 | 2.03 | 2.57 |
| 1990 | 100.0 | 0.0 | 100.0 | 17.52 | 8.93 | 4.88 | 2.94 | 2.91 |
| 1990 | 50.0 | 0.0 | 50.0 | 8.11 | 4.68 | 3.01 | 2.18 | 2.37 |
| 1990 | 0.0 | 50.0 | 0.0 | 2.36 | 2.14 | 1.97 | 1.83 | 2.23 |
| 1990 | 50.0 | 50.0 | 50.0 | 9.99 | 5.61 | 3.51 | 2.49 | 2.74 |
| 1990 | 20.6 | 27.3 | 20.6 | 4.71 | 3.17 | 2.39 | 1.96 | 2.28 |
| 1995 | 0.0 | 0.0 | 0.0 | 1.81 | 1.58 | 1.41 | 1.27 | 1.40 |
| 1995 | 0.0 | 100.0 | 0.0 | 1.97 | 1.78 | 1.62 | 1.48 | 1.76 |
| 1995 | 100.0 | 0.0 | 100.0 | 16.76 | 7.93 | 4.01 | 2.26 | 2.52 |
| 1995 | 50.0 | 0.0 | 50.0 | 7.53 | 4.00 | 2.39 | 1.64 | 1.82 |
| 1995 | 0.0 | 50.0 | 0.0 | 1.85 | 1.64 | 1.47 | 1.34 | 1.53 |
| 1995 | 50.0 | 50.0 | 50.0 | 9.37 | 4.85 | 2.81 | 1.87 | 2.14 |
| 1995 | 20.6 | 27.3 | 20.6 | 4.17 | 2.60 | 1.84 | 1.46 | 1.64 |
| 2000 | 0.0 | 0.0 | 0.0 | 1.61 | 1.40 | 1.24 | 1.12 | 1.15 |
| 2000 | 0.0 | 100.0 | 0.0 | 1.79 | 1.59 | 1.42 | 1.29 | 1.46 |
| 2000 | 100.0 | 0.0 | 100.0 | 15.98 | 7.35 | 3.61 | 1.98 | 2.36 |
| 2000 | 50.0 | 0.0 | 50.0 | 7.14 | 3.68 | 2.14 | 1.44 | 1.61 |
| 2000 | 0.0 | 50.0 | 0.0 | 1.66 | 1.46 | 1.30 | 1.18 | 1.26 |
| 2000 | 50.0 | 50.0 | 50.0 | 8.88 | 4.47 | 2.52 | 1.64 | 1.91 |
| 2000 | 20.6 | 27.3 | 20.6 | 3.89 | 2.36 | 1.64 | 1.28 | 1.40 |

TABLE 4 : THC AT 35.0 MPH.

## TABLE 5

## LOW ALTITUDE

## THC EMISSION FACTORS (GRAMS/MILE) AT 50.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | Combined for Eight Vehicle Types ------- @ Ambient Temperature ------- 0 F | 25 F | 50 F | 75 F | 100 F |
|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 4.64 | 4.45 | 4.29 | 4.15 | 4.49 |
| 1980 | 0.0 | 100.0 | 0.0 | 4.63 | 4.60 | 4.59 | 4.59 | 5.27 |
| 1980 | 100.0 | 0.0 | 100.0 | 18.90 | 11.98 | 8.03 | 5.77 | 5.01 |
| 1980 | 50.0 | 0.0 | 50.0 | 10.28 | 7.42 | 5.76 | 4.78 | 4.68 |
| 1980 | 0.0 | 50.0 | 0.0 | 4.61 | 4.49 | 4.39 | 4.31 | 4.78 |
| 1980 | 50.0 | 50.0 | 50.0 | 11.76 | 8.29 | 6.31 | 5.18 | 5.14 |
| 1980 | 20.6 | 27.3 | 20.6 | 6.93 | 5.69 | 4.95 | 4.49 | 4.72 |
| 1985 | 0.0 | 0.0 | 0.0 | 2.94 | 2.76 | 2.61 | 2.49 | 2.85 |
| 1985 | 0.0 | 100.0 | 0.0 | 2.93 | 2.87 | 2.83 | 2.79 | 3.37 |
| 1985 | 100.0 | 0.0 | 100.0 | 13.74 | 8.13 | 5.17 | 3.59 | 3.23 |
| 1985 | 50.0 | 0.0 | 50.0 | 7.09 | 4.82 | 3.59 | 2.90 | 2.98 |
| 1985 | 0.0 | 50.0 | 0.0 | 2.92 | 2.79 | 2.68 | 2.59 | 3.03 |
| 1985 | 50.0 | 50.0 | 50.0 | 8.34 | 5.50 | 4.00 | 3.19 | 3.30 |
| 1985 | 20.6 | 27.3 | 20.6 | 4.62 | 3.61 | 3.05 | 2.71 | 3.00 |
| 1988 | 0.0 | 0.0 | 0.0 | 2.21 | 2.03 | 1.89 | 1.77 | 2.06 |
| 1988 | 0.0 | 100.0 | 0.0 | 2.25 | 2.16 | 2.08 | 2.01 | 2.47 |
| 1988 | 100.0 | 0.0 | 100.0 | 12.45 | 6.84 | 4.07 | 2.69 | 2.53 |
| 1988 | 50.0 | 0.0 | 50.0 | 6.11 | 3.85 | 2.71 | 2.11 | 2.23 |
| 1988 | 0.0 | 50.0 | 0.0 | 2.21 | 2.06 | 1.95 | 1.86 | 2.20 |
| 1988 | 50.0 | 50.0 | 50.0 | 7.35 | 4.50 | 3.08 | 2.35 | 2.50 |
| 1988 | 20.6 | 27.3 | 20.6 | 3.80 | 2.79 | 2.26 | 1.96 | 2.21 |
| 1990 | 0.0 | 0.0 | 0.0 | 1.88 | 1.71 | 1.57 | 1.46 | 1.69 |
| 1990 | 0.0 | 100.0 | 0.0 | 1.95 | 1.84 | 1.74 | 1.67 | 2.03 |
| 1990 | 100.0 | 0.0 | 100.0 | 12.02 | 6.29 | 3.59 | 2.29 | 2.25 |
| 1990 | 50.0 | 0.0 | 50.0 | 5.74 | 3.45 | 2.33 | 1.77 | 1.89 |
| 1990 | 0.0 | 50.0 | 0.0 | 1.89 | 1.74 | 1.63 | 1.53 | 1.81 |
| 1990 | 50.0 | 50.0 | 50.0 | 6.98 | 4.07 | 2.67 | 1.98 | 2.14 |
| 1990 | 20.6 | 27.3 | 20.6 | 3.46 | 2.44 | 1.91 | 1.63 | 1.84 |
| 1995 | 0.0 | 0.0 | 0.0 | 1.42 | 1.27 | 1.15 | 1.06 | 1.15 |
| 1995 | 0.0 | 100.0 | 0.0 | 1.53 | 1.40 | 1.29 | 1.21 | 1.39 |
| 1995 | 100.0 | 0.0 | 100.0 | 11.23 | 5.44 | 2.87 | 1.72 | 1.89 |
| 1995 | 50.0 | 0.0 | 50.0 | 5.17 | 2.86 | 1.80 | 1.31 | 1.43 |
| 1995 | 0.0 | 50.0 | 0.0 | 1.45 | 1.31 | 1.20 | 1.11 | 1.23 |
| 1995 | 50.0 | 50.0 | 50.0 | 6.38 | 3.42 | 2.08 | 1.46 | 1.64 |
| 1995 | 20.6 | 27.3 | 20.6 | 2.97 | 1.94 | 1.44 | 1.19 | 1.31 |
| 2000 | 0.0 | 0.0 | 0.0 | 1.26 | 1.12 | 1.02 | 0.94 | 0.96 |
| 2000 | 0.0 | 100.0 | 0.0 | 1.38 | 1.25 | 1.14 | 1.05 | 1.16 |
| 2000 | 100.0 | 0.0 | 100.0 | 10.67 | 5.02 | 2.57 | 1.51 | 1.75 |
| 2000 | 50.0 | 0.0 | 50.0 | 4.88 | 2.62 | 1.61 | 1.15 | 1.26 |
| 2000 | 0.0 | 50.0 | 0.0 | 1.29 | 1.16 | 1.06 | 0.98 | 1.03 |
| 2000 | 50.0 | 50.0 | 50.0 | 6.02 | 3.13 | 1.86 | 1.28 | 1.46 |
| 2000 | 20.6 | 27.3 | 20.6 | 2.75 | 1.75 | 1.28 | 1.05 | 1.12 |

TABLE 5 : THC AT 50.0 MPH.

## TABLE 6

## LOW ALTITUDE

## THC EMISSION FACTORS (GRAMS/MILE) AT 55.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | Combined for Eight Vehicle Types @ Ambient Temperature 0 F | 25 F | 50 F | 75 F | 100 F |
|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 4.50 | 4.33 | 4.18 | 4.05 | 4.36 |
| 1980 | 0.0 | 100.0 | 0.0 | 4.49 | 4.47 | 4.46 | 4.46 | 5.08 |
| 1980 | 100.0 | 0.0 | 100.0 | 17.80 | 11.35 | 7.67 | 5.56 | 4.85 |
| 1980 | 50.0 | 0.0 | 50.0 | 9.77 | 7.11 | 5.55 | 4.64 | 4.54 |
| 1980 | 0.0 | 50.0 | 0.0 | 4.48 | 4.37 | 4.28 | 4.20 | 4.63 |
| 1980 | 50.0 | 50.0 | 50.0 | 11.15 | 7.91 | 6.06 | 5.01 | 4.96 |
| 1980 | 20.6 | 27.3 | 20.6 | 6.64 | 5.49 | 4.79 | 4.37 | 4.58 |
| 1985 | 0.0 | 0.0 | 0.0 | 2.83 | 2.66 | 2.53 | 2.42 | 2.74 |
| 1985 | 0.0 | 100.0 | 0.0 | 2.82 | 2.77 | 2.73 | 2.69 | 3.22 |
| 1985 | 100.0 | 0.0 | 100.0 | 12.70 | 7.57 | 4.87 | 3.42 | 3.10 |
| 1985 | 50.0 | 0.0 | 50.0 | 6.62 | 4.55 | 3.42 | 2.80 | 2.86 |
| 1985 | 0.0 | 50.0 | 0.0 | 2.81 | 2.69 | 2.59 | 2.51 | 2.91 |
| 1985 | 50.0 | 50.0 | 50.0 | 7.76 | 5.17 | 3.80 | 3.06 | 3.16 |
| 1985 | 20.6 | 27.3 | 20.6 | 4.37 | 3.45 | 2.93 | 2.62 | 2.88 |
| 1988 | 0.0 | 0.0 | 0.0 | 2.11 | 1.95 | 1.82 | 1.72 | 1.98 |
| 1988 | 0.0 | 100.0 | 0.0 | 2.15 | 2.06 | 1.99 | 1.93 | 2.35 |
| 1988 | 100.0 | 0.0 | 100.0 | 11.41 | 6.32 | 3.81 | 2.55 | 2.40 |
| 1988 | 50.0 | 0.0 | 50.0 | 5.65 | 3.61 | 2.57 | 2.03 | 2.13 |
| 1988 | 0.0 | 50.0 | 0.0 | 2.11 | 1.98 | 1.87 | 1.79 | 2.11 |
| 1988 | 50.0 | 50.0 | 50.0 | 6.78 | 4.19 | 2.90 | 2.24 | 2.38 |
| 1988 | 20.6 | 27.3 | 20.6 | 3.55 | 2.64 | 2.15 | 1.88 | 2.11 |
| 1990 | 0.0 | 0.0 | 0.0 | 1.79 | 1.63 | 1.51 | 1.42 | 1.62 |
| 1990 | 0.0 | 100.0 | 0.0 | 1.85 | 1.75 | 1.67 | 1.60 | 1.93 |
| 1990 | 100.0 | 0.0 | 100.0 | 10.96 | 5.79 | 3.34 | 2.16 | 2.13 |
| 1990 | 50.0 | 0.0 | 50.0 | 5.28 | 3.21 | 2.20 | 1.69 | 1.80 |
| 1990 | 0.0 | 50.0 | 0.0 | 1.80 | 1.67 | 1.56 | 1.48 | 1.73 |
| 1990 | 50.0 | 50.0 | 50.0 | 6.41 | 3.77 | 2.50 | 1.88 | 2.03 |
| 1990 | 20.6 | 27.3 | 20.6 | 3.22 | 2.29 | 1.82 | 1.56 | 1.75 |
| 1995 | 0.0 | 0.0 | 0.0 | 1.35 | 1.21 | 1.11 | 1.03 | 1.11 |
| 1995 | 0.0 | 100.0 | 0.0 | 1.45 | 1.33 | 1.23 | 1.16 | 1.32 |
| 1995 | 100.0 | 0.0 | 100.0 | 10.18 | 4.97 | 2.65 | 1.62 | 1.77 |
| 1995 | 50.0 | 0.0 | 50.0 | 4.73 | 2.65 | 1.69 | 1.25 | 1.36 |
| 1995 | 0.0 | 50.0 | 0.0 | 1.37 | 1.25 | 1.15 | 1.07 | 1.18 |
| 1995 | 50.0 | 50.0 | 50.0 | 5.81 | 3.15 | 1.94 | 1.39 | 1.55 |
| 1995 | 20.6 | 27.3 | 20.6 | 2.74 | 1.82 | 1.37 | 1.14 | 1.25 |
| 2000 | 0.0 | 0.0 | 0.0 | 1.19 | 1.07 | 0.98 | 0.91 | 0.93 |
| 2000 | 0.0 | 100.0 | 0.0 | 1.30 | 1.18 | 1.09 | 1.01 | 1.11 |
| 2000 | 100.0 | 0.0 | 100.0 | 9.65 | 4.58 | 2.38 | 1.42 | 1.64 |
| 2000 | 50.0 | 0.0 | 50.0 | 4.45 | 2.42 | 1.51 | 1.10 | 1.20 |
| 2000 | 0.0 | 50.0 | 0.0 | 1.23 | 1.11 | 1.02 | 0.94 | 0.99 |
| 2000 | 50.0 | 50.0 | 50.0 | 5.[illegible]9 | 2.88 | 1.73 | 1.22 | 1.37 |
| 2000 | 20.6 | 27.3 | 20.6 | 2.54 | 1.64 | 1.22 | 1.00 | 1.07 |

TABLE 6 : THC AT 55.0 MPH.

## TABLE 7

## LOW ALTITUDE

## CO EMISSION FACTORS (GRAMS/MILE) AT 5.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types @ Ambient Temperature | | | | |
|---|---|---|---|---|---|---|---|---|
| | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 209.88 | 189.00 | 171.68 | 157.31 | 302.54 |
| 1980 | 0.0 | 100.0 | 0.0 | 157.76 | 160.48 | 164.14 | 168.81 | 313.84 |
| 1980 | 100.0 | 0.0 | 100.0 | 1533.32 | 910.75 | 546.95 | 332.53 | 224.41 |
| 1980 | 50.0 | 0.0 | 50.0 | 713.77 | 463.42 | 313.89 | 223.14 | 268.86 |
| 1980 | 0.0 | 50.0 | 0.0 | 187.83 | 176.32 | 167.31 | 160.43 | 303.21 |
| 1980 | 50.0 | 50.0 | 50.0 | 845.54 | 535.61 | 355.54 | 250.67 | 269.13 |
| 1980 | 20.6 | 27.3 | 20.6 | 403.58 | 294.10 | 227.31 | 185.82 | 289.00 |
| 1985 | 0.0 | 0.0 | 0.0 | 147.22 | 124.34 | 106.69 | 92.89 | 208.19 |
| 1985 | 0.0 | 100.0 | 0.0 | 108.78 | 104.42 | 101.64 | 100.18 | 193.67 |
| 1985 | 100.0 | 0.0 | 100.0 | 1051.92 | 618.55 | 360.14 | 198.51 | 142.25 |
| 1985 | 50.0 | 0.0 | 50.0 | 485.02 | 308.49 | 200.65 | 131.42 | 179.77 |
| 1985 | 0.0 | 50.0 | 0.0 | 130.27 | 114.89 | 103.24 | 94.39 | 199.16 |
| 1985 | 50.0 | 50.0 | 50.0 | 580.35 | 361.48 | 230.89 | 149.35 | 167.96 |
| 1985 | 20.6 | 27.3 | 20.6 | 275.83 | 194.31 | 143.12 | 109.38 | 191.56 |
| 1988 | 0.0 | 0.0 | 0.0 | 116.60 | 92.21 | 74.62 | 61.69 | 142.55 |
| 1988 | 0.0 | 100.0 | 0.0 | 89.32 | 80.47 | 73.96 | 69.29 | 130.76 |
| 1988 | 100.0 | 0.0 | 100.0 | 812.72 | 478.87 | 275.13 | 140.36 | 99.97 |
| 1988 | 50.0 | 0.0 | 50.0 | 375.10 | 235.54 | 148.60 | 90.16 | 123.82 |
| 1988 | 0.0 | 50.0 | 0.0 | 103.96 | 86.03 | 73.03 | 63.51 | 135.28 |
| 1988 | 50.0 | 50.0 | 50.0 | 451.02 | 279.67 | 174.55 | 104.83 | 115.36 |
| 1988 | 20.6 | 27.3 | 20.6 | 215.18 | 147.30 | 103.91 | 74.26 | 130.86 |
| 1990 | 0.0 | 0.0 | 0.0 | 101.83 | 76.64 | 59.17 | 46.84 | 106.66 |
| 1990 | 0.0 | 100.0 | 0.0 | 80.50 | 69.26 | 60.85 | 54.60 | 98.80 |
| 1990 | 100.0 | 0.0 | 100.0 | 684.56 | 404.50 | 231.08 | 111.88 | 80.63 |
| 1990 | 50.0 | 0.0 | 50.0 | 317.92 | 198.07 | 122.58 | 70.34 | 94.77 |
| 1990 | 0.0 | 50.0 | 0.0 | 91.53 | 72.24 | 58.62 | 48.87 | 101.45 |
| 1990 | 50.0 | 50.0 | 50.0 | 382.53 | 236.88 | 145.97 | 83.24 | 89.72 |
| 1990 | 20.6 | 27.3 | 20.6 | 184.37 | 123.76 | 84.71 | 57.49 | 98.90 |
| 1995 | 0.0 | 0.0 | 0.0 | 80.95 | 55.15 | 38.39 | 27.40 | 51.16 |
| 1995 | 0.0 | 100.0 | 0.0 | 68.92 | 54.42 | 43.53 | 35.34 | 53.66 |
| 1995 | 100.0 | 0.0 | 100.0 | 495.24 | 296.00 | 168.47 | 73.26 | 54.45 |
| 1995 | 50.0 | 0.0 | 50.0 | 235.16 | 144.77 | 86.67 | 44.10 | 51.39 |
| 1995 | 0.0 | 50.0 | 0.0 | 74.39 | 53.56 | 39.47 | 29.81 | 50.98 |
| 1995 | 50.0 | 50.0 | 50.0 | 282.08 | 175.21 | 106.00 | 54.30 | 54.05 |
| 1995 | 20.6 | 27.3 | 20.6 | 140.27 | 90.83 | 58.65 | 35.50 | 51.11 |
| 2000 | 0.0 | 0.0 | 0.0 | 73.14 | 47.86 | 31.83 | 21.63 | 31.90 |
| 2000 | 0.0 | 100.0 | 0.0 | 63.84 | 48.79 | 37.54 | 29.12 | 38.47 |
| 2000 | 100.0 | 0.0 | 100.0 | 430.17 | 258.83 | 147.20 | 60.51 | 45.86 |
| 2000 | 50.0 | 0.0 | 50.0 | 206.99 | 126.90 | 74.97 | 35.94 | 36.53 |
| 2000 | 0.0 | 50.0 | 0.0 | 67.73 | 47.03 | 33.26 | 24.01 | 33.69 |
| 2000 | 50.0 | 50.0 | 50.0 | 247.00 | 153.81 | 92.37 | 44.82 | 42.17 |
| 2000 | 20.6 | 27.3 | 20.6 | 124.79 | 79.64 | 50.19 | 28.74 | 34.73 |

TABLE 7 : CO AT 5.0 MPH.

## TABLE 8

## LOW ALTITUDE

## CO EMISSION FACTORS (GRAMS/MILE) AT 10.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types ------- @ Ambient Temperature ------- | | | | |
|---|---|---|---|---|---|---|---|---|
| | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 112.95 | 101.24 | 91.57 | 83.55 | 163.50 |
| 1980 | 0.0 | 100.0 | 0.0 | 86.23 | 86.92 | 88.12 | 89.84 | 166.70 |
| 1980 | 100.0 | 0.0 | 100.0 | 809.12 | 479.39 | 287.60 | 174.90 | 121.41 |
| 1980 | 50.0 | 0.0 | 50.0 | 376.69 | 244.32 | 165.49 | 117.68 | 145.33 |
| 1980 | 0.0 | 50.0 | 0.0 | 101.56 | 94.78 | 89.40 | 85.23 | 162.68 |
| 1980 | 50.0 | 50.0 | 50.0 | 447.67 | 283.16 | 187.86 | 132.37 | 144.05 |
| 1980 | 20.6 | 27.3 | 20.6 | 214.40 | 156.11 | 120.54 | 98.36 | 155.56 |
| 1985 | 0.0 | 0.0 | 0.0 | 88.53 | 73.57 | 62.24 | 53.52 | 122.69 |
| 1985 | 0.0 | 100.0 | 0.0 | 67.45 | 63.52 | 60.73 | 58.86 | 113.38 |
| 1985 | 100.0 | 0.0 | 100.0 | 638.33 | 375.87 | 217.77 | 116.68 | 85.47 |
| 1985 | 50.0 | 0.0 | 50.0 | 292.38 | 185.49 | 119.56 | 76.38 | 106.60 |
| 1985 | 0.0 | 50.0 | 0.0 | 79.06 | 68.59 | 60.71 | 54.75 | 117.03 |
| 1985 | 50.0 | 50.0 | 50.0 | 352.89 | 219.70 | 139.25 | 87.77 | 99.42 |
| 1985 | 20.6 | 27.3 | 20.6 | 166.53 | 116.50 | 84.77 | 63.49 | 112.98 |
| 1988 | 0.0 | 0.0 | 0.0 | 76.35 | 59.00 | 46.73 | 37.88 | 88.55 |
| 1988 | 0.0 | 100.0 | 0.0 | 60.37 | 53.17 | 47.79 | 43.79 | 81.58 |
| 1988 | 100.0 | 0.0 | 100.0 | 537.15 | 317.70 | 181.87 | 89.58 | 64.67 |
| 1988 | 50.0 | 0.0 | 50.0 | 246.63 | 154.52 | 96.42 | 56.50 | 77.92 |
| 1988 | 0.0 | 50.0 | 0.0 | 68.74 | 55.64 | 46.24 | 39.41 | 84.14 |
| 1988 | 50.0 | 50.0 | 50.0 | 298.76 | 185.44 | 114.83 | 66.69 | 73.13 |
| 1988 | 20.6 | 27.3 | 20.6 | 141.66 | 96.12 | 66.71 | 46.28 | 81.75 |
| 1990 | 0.0 | 0.0 | 0.0 | 70.61 | 51.94 | 39.20 | 30.36 | 69.05 |
| 1990 | 0.0 | 100.0 | 0.0 | 57.37 | 48.38 | 41.61 | 36.53 | 64.86 |
| 1990 | 100.0 | 0.0 | 100.0 | 479.09 | 284.16 | 161.89 | 75.84 | 55.05 |
| 1990 | 50.0 | 0.0 | 50.0 | 221.61 | 137.74 | 84.38 | 46.76 | 62.46 |
| 1990 | 0.0 | 50.0 | 0.0 | 64.01 | 49.47 | 39.29 | 32.07 | 66.00 |
| 1990 | 50.0 | 50.0 | 50.0 | 268.23 | 166.27 | 101.75 | 56.18 | 59.96 |
| 1990 | 20.6 | 27.3 | 20.6 | 128.60 | 85.58 | 57.66 | 37.95 | 64.65 |
| 1995 | 0.0 | 0.0 | 0.0 | 61.87 | 41.63 | 28.56 | 20.06 | 36.93 |
| 1995 | 0.0 | 100.0 | 0.0 | 53.05 | 41.52 | 32.86 | 26.36 | 39.43 |
| 1995 | 100.0 | 0.0 | 100.0 | 382.11 | 228.64 | 129.87 | 55.48 | 41.13 |
| 1995 | 50.0 | 0.0 | 50.0 | 181.05 | 111.21 | 66.18 | 32.96 | 37.78 |
| 1995 | 0.0 | 50.0 | 0.0 | 56.97 | 40.57 | 29.52 | 21.99 | 37.04 |
| 1995 | 50.0 | 50.0 | 50.0 | 217.58 | 135.08 | 81.37 | 40.92 | 40.28 |
| 1995 | 20.6 | 27.3 | 20.6 | 107.81 | 69.42 | 44.41 | 26.35 | 37.30 |
| 2000 | 0.0 | 0.0 | 0.0 | 57.60 | 37.43 | 24.67 | 16.58 | 24.49 |
| 2000 | 0.0 | 100.0 | 0.0 | 50.20 | 38.19 | 29.22 | 22.52 | 29.66 |
| 2000 | 100.0 | 0.0 | 100.0 | 342.13 | 205.64 | 116.66 | 47.45 | 35.76 |
| 2000 | 50.0 | 0.0 | 50.0 | 164.28 | 100.46 | 59.07 | 27.94 | 28.23 |
| 2000 | 0.0 | 50.0 | 0.0 | 53.28 | 36.77 | 25.81 | 18.46 | 25.89 |
| 2000 | 50.0 | 50.0 | 50.0 | 196.16 | 121.92 | 72.94 | 34.99 | 32.71 |
| 2000 | 20.6 | 27.3 | 20.6 | 98.77 | 62.78 | 39.31 | 22.22 | 26.75 |

TABLE 8 : CO AT 10.0 MPH.

## TABLE 9

## LOW ALTITUDE

## CO EMISSION FACTORS (GRAMS/MILE) AT 19.6 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types @ Ambient Temperature | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 61.73 | 55.09 | 49.63 | 45.13 | 90.23 |
| 1980 | 0.0 | 100.0 | 0.0 | 46.98 | 47.23 | 47.73 | 48.52 | 90.08 |
| 1980 | 100.0 | 0.0 | 100.0 | 442.77 | 261.35 | 156.22 | 94.63 | 65.81 |
| 1980 | 50.0 | 0.0 | 50.0 | 206.23 | 133.19 | 89.84 | 63.61 | 79.63 |
| 1980 | 0.0 | 50.0 | 0.0 | 55.38 | 51.49 | 48.40 | 46.00 | 88.94 |
| 1980 | 50.0 | 50.0 | 50.0 | 244.88 | 154.29 | 101.98 | 71.57 | 77.95 |
| 1980 | 20.6 | 27.3 | 20.6 | 117.26 | 85.00 | 65.36 | 53.13 | 85.16 |
| 1985 | 0.0 | 0.0 | 0.0 | 50.51 | 41.53 | 34.80 | 29.67 | 69.42 |
| 1985 | 0.0 | 100.0 | 0.0 | 38.57 | 36.01 | 34.15 | 32.86 | 63.30 |
| 1985 | 100.0 | 0.0 | 100.0 | 369.26 | 217.37 | 125.34 | 65.81 | 47.99 |
| 1985 | 50.0 | 0.0 | 50.0 | 168.83 | 106.70 | 68.20 | 42.75 | 60.09 |
| 1985 | 0.0 | 50.0 | 0.0 | 45.08 | 38.73 | 33.98 | 30.40 | 65.82 |
| 1985 | 50.0 | 50.0 | 50.0 | 203.92 | 126.69 | 79.75 | 49.33 | 55.64 |
| 1985 | 20.6 | 27.3 | 20.6 | 95.82 | 66.59 | 47.97 | 35.39 | 63.61 |
| 1988 | 0.0 | 0.0 | 0.0 | 45.34 | 34.55 | 26.99 | 21.60 | 51.19 |
| 1988 | 0.0 | 100.0 | 0.0 | 36.03 | 31.38 | 27.88 | 25.27 | 46.87 |
| 1988 | 100.0 | 0.0 | 100.0 | 322.29 | 190.88 | 108.91 | 52.45 | 37.68 |
| 1988 | 50.0 | 0.0 | 50.0 | 147.86 | 92.37 | 57.17 | 32.73 | 45.10 |
| 1988 | 0.0 | 50.0 | 0.0 | 40.83 | 32.63 | 26.78 | 22.57 | 48.47 |
| 1988 | 50.0 | 50.0 | 50.0 | 179.16 | 111.13 | 68.39 | 38.86 | 42.27 |
| 1988 | 20.6 | 27.3 | 20.6 | 84.70 | 57.08 | 39.17 | 26.65 | 47.19 |
| 1990 | 0.0 | 0.0 | 0.0 | 43.02 | 31.22 | 23.23 | 17.74 | 40.53 |
| 1990 | 0.0 | 100.0 | 0.0 | 35.14 | 29.32 | 24.93 | 21.64 | 38.10 |
| 1990 | 100.0 | 0.0 | 100.0 | 294.40 | 174.90 | 99.40 | 45.62 | 32.92 |
| 1990 | 50.0 | 0.0 | 50.0 | 136.12 | 84.40 | 51.33 | 27.81 | 36.85 |
| 1990 | 0.0 | 50.0 | 0.0 | 39.03 | 29.79 | 23.37 | 18.83 | 38.72 |
| 1990 | 50.0 | 50.0 | 50.0 | 164.77 | 102.11 | 62.16 | 33.63 | 35.51 |
| 1990 | 20.6 | 27.3 | 20.6 | 78.82 | 52.13 | 34.75 | 22.43 | 38.01 |
| 1995 | 0.0 | 0.0 | 0.0 | 39.31 | 26.21 | 17.79 | 12.34 | 22.56 |
| 1995 | 0.0 | 100.0 | 0.0 | 33.74 | 26.24 | 20.62 | 16.40 | 24.32 |
| 1995 | 100.0 | 0.0 | 100.0 | 244.71 | 146.49 | 83.06 | 35.02 | 25.81 |
| 1995 | 50.0 | 0.0 | 50.0 | 115.85 | 71.02 | 42.05 | 20.61 | 23.32 |
| 1995 | 0.0 | 50.0 | 0.0 | 36.19 | 25.57 | 18.43 | 13.59 | 22.70 |
| 1995 | 50.0 | 50.0 | 50.0 | 139.22 | 86.36 | 51.84 | 25.71 | 25.06 |
| 1995 | 20.6 | 27.3 | 20.6 | 68.83 | 44.13 | 28.03 | 16.38 | 22.93 |
| 2000 | 0.0 | 0.0 | 0.0 | 37.18 | 24.01 | 15.70 | 10.44 | 15.44 |
| 2000 | 0.0 | 100.0 | 0.0 | 32.35 | 24.51 | 18.67 | 14.31 | 18.82 |
| 2000 | 100.0 | 0.0 | 100.0 | 222.99 | 133.91 | 75.81 | 30.56 | 22.89 |
| 2000 | 50.0 | 0.0 | 50.0 | 106.87 | 65.20 | 38.18 | 17.85 | 17.92 |
| 2000 | 0.0 | 50.0 | 0.0 | 34.36 | 23.59 | 16.44 | 11.67 | 16.36 |
| 2000 | 50.0 | 50.0 | 50.0 | 127.67 | 79.21 | 47.24 | 22.44 | 20.85 |
| 2000 | 20.6 | 27.3 | 20.6 | 64.07 | 40.58 | 25.27 | 14.12 | 16.93 |

TABLE 9 : CO AT 19.6 MPH.

## TABLE 10

## LOW ALTITUDE

## CO EMISSION FACTORS (GRAMS/MILE) AT 35.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | Combined for Eight Vehicle Types @ Ambient Temperature 0 F | 25 F | 50 F | 75 F | 100 F |
|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 33.49 | 30.07 | 27.27 | 24.96 | 48.55 |
| 1980 | 0.0 | 100.0 | 0.0 | 25.80 | 25.96 | 26.26 | 26.72 | 48.93 |
| 1980 | 100.0 | 0.0 | 100.0 | 234.34 | 139.29 | 83.90 | 51.26 | 35.82 |
| 1980 | 50.0 | 0.0 | 50.0 | 110.17 | 71.71 | 48.78 | 34.85 | 43.01 |
| 1980 | 0.0 | 50.0 | 0.0 | 30.17 | 28.19 | 26.63 | 25.41 | 48.06 |
| 1980 | 50.0 | 50.0 | 50.0 | 130.07 | 82.62 | 55.08 | 38.99 | 42.37 |
| 1980 | 20.6 | 27.3 | 20.6 | 62.99 | 46.04 | 35.69 | 29.24 | 46.00 |
| 1985 | 0.0 | 0.0 | 0.0 | 25.86 | 21.39 | 18.04 | 15.48 | 35.29 |
| 1985 | 0.0 | 100.0 | 0.0 | 19.82 | 18.53 | 17.59 | 16.95 | 32.34 |
| 1985 | 100.0 | 0.0 | 100.0 | 183.61 | 108.73 | 63.10 | 33.39 | 24.69 |
| 1985 | 50.0 | 0.0 | 50.0 | 84.83 | 53.98 | 34.77 | 22.01 | 30.64 |
| 1985 | 0.0 | 50.0 | 0.0 | 23.11 | 19.95 | 17.59 | 15.81 | 33.53 |
| 1985 | 50.0 | 50.0 | 50.0 | 101.71 | 63.63 | 40.35 | 25.17 | 28.52 |
| 1985 | 20.6 | 27.3 | 20.6 | 48.43 | 33.90 | 24.61 | 18.32 | 32.41 |
| 1988 | 0.0 | 0.0 | 0.0 | 22.84 | 17.45 | 13.68 | 11.00 | 25.47 |
| 1988 | 0.0 | 100.0 | 0.0 | 18.19 | 15.82 | 14.05 | 12.73 | 23.38 |
| 1988 | 100.0 | 0.0 | 100.0 | 158.59 | 94.39 | 54.08 | 26.09 | 19.01 |
| 1988 | 50.0 | 0.0 | 50.0 | 73.37 | 46.05 | 28.63 | 16.47 | 22.52 |
| 1988 | 0.0 | 50.0 | 0.0 | 20.58 | 16.48 | 13.55 | 11.45 | 24.15 |
| 1988 | 50.0 | 50.0 | 50.0 | 88.39 | 55.10 | 34.06 | 19.41 | 21.20 |
| 1988 | 20.6 | 27.3 | 20.6 | 42.22 | 28.58 | 19.71 | 13.47 | 23.53 |
| 1990 | 0.0 | 0.0 | 0.0 | 21.61 | 15.70 | 11.70 | 8.96 | 20.00 |
| 1990 | 0.0 | 100.0 | 0.0 | 17.70 | 14.73 | 12.51 | 10.83 | 18.87 |
| 1990 | 100.0 | 0.0 | 100.0 | 144.94 | 86.48 | 49.31 | 22.61 | 16.53 |
| 1990 | 50.0 | 0.0 | 50.0 | 67.49 | 42.00 | 25.63 | 13.92 | 18.28 |
| 1990 | 0.0 | 50.0 | 0.0 | 19.62 | 14.98 | 11.75 | 9.49 | 19.13 |
| 1990 | 50.0 | 50.0 | 50.0 | 81.32 | 50.61 | 30.91 | 16.72 | 17.70 |
| 1990 | 20.6 | 27.3 | 20.6 | 39.24 | 26.03 | 17.41 | 11.26 | 18.81 |
| 1995 | 0.0 | 0.0 | 0.0 | 19.90 | 13.27 | 9.01 | 6.26 | 11.18 |
| 1995 | 0.0 | 100.0 | 0.0 | 17.12 | 13.30 | 10.43 | 8.28 | 12.14 |
| 1995 | 100.0 | 0.0 | 100.0 | 122.36 | 73.43 | 41.72 | 17.56 | 13.05 |
| 1995 | 50.0 | 0.0 | 50.0 | 58.15 | 35.72 | 21.19 | 10.39 | 11.65 |
| 1995 | 0.0 | 50.0 | 0.0 | 18.34 | 12.95 | 9.34 | 6.88 | 11.29 |
| 1995 | 50.0 | 50.0 | 50.0 | 69.74 | 43.37 | 26.08 | 12.92 | 12.60 |
| 1995 | 20.6 | 27.3 | 20.6 | 34.65 | 22.25 | 14.15 | 8.28 | 11.42 |
| 2000 | 0.0 | 0.0 | 0.0 | 19.00 | 12.29 | 8.06 | 5.37 | 7.87 |
| 2000 | 0.0 | 100.0 | 0.0 | 16.55 | 12.55 | 9.57 | 7.34 | 9.61 |
| 2000 | 100.0 | 0.0 | 100.0 | 113.25 | 68.07 | 38.58 | 15.58 | 11.72 |
| 2000 | 50.0 | 0.0 | 50.0 | 54.36 | 33.20 | 19.48 | 9.13 | 11.72 |
| 2000 | 0.0 | 50.0 | 0.0 | 17.57 | 12.08 | 8.43 | 6.00 | 9.16 |
| 2000 | 50.0 | 50.0 | 50.0 | 64.90 | 40.31 | 24.08 | 11.46 | 8.35 |
| 2000 | 20.6 | 27.3 | 20.6 | 32.64 | 20.70 | 12.92 | 7.24 | 8.65 |

TABLE 10 : CO AT 35.0 MPH.

## TABLE 11

## LOW ALTITUDE

## CO EMISSION FACTORS (GRAMS/MILE) AT 50.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types ------- @ Ambient Temperature ------- | | | | |
|---|---|---|---|---|---|---|---|---|
| | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 26.20 | 23.62 | 21.49 | 19.73 | 37.82 |
| 1980 | 0.0 | 100.0 | 0.0 | 20.41 | 20.47 | 20.64 | 20.94 | 37.92 |
| 1980 | 100.0 | 0.0 | 100.0 | 173.21 | 103.66 | 63.01 | 39.00 | 28.10 |
| 1980 | 50.0 | 0.0 | 50.0 | 82.83 | 54.39 | 37.39 | 27.04 | 33.56 |
| 1980 | 0.0 | 50.0 | 0.0 | 23.69 | 22.18 | 20.97 | 20.04 | 37.37 |
| 1980 | 50.0 | 50.0 | 50.0 | 96.81 | 62.06 | 41.83 | 29.97 | 33.01 |
| 1980 | 20.6 | 27.3 | 20.6 | 47.96 | 35.40 | 27.70 | 22.88 | 35.82 |
| 1985 | 0.0 | 0.0 | 0.0 | 18.33 | 15.47 | 13.28 | 11.58 | 25.56 |
| 1985 | 0.0 | 100.0 | 0.0 | 14.00 | 13.24 | 12.69 | 12.32 | 23.29 |
| 1985 | 100.0 | 0.0 | 100.0 | 118.31 | 70.37 | 41.44 | 22.97 | 17.89 |
| 1985 | 50.0 | 0.0 | 50.0 | 56.16 | 36.18 | 23.84 | 15.78 | 22.18 |
| 1985 | 0.0 | 50.0 | 0.0 | 16.37 | 14.38 | 12.87 | 11.72 | 24.25 |
| 1985 | 50.0 | 50.0 | 50.0 | 66.16 | 41.80 | 27.07 | 17.65 | 20.59 |
| 1985 | 20.6 | 27.3 | 20.6 | 32.71 | 23.33 | 17.37 | 13.36 | 23.46 |
| 1988 | 0.0 | 0.0 | 0.0 | 14.74 | 11.60 | 9.35 | 7.72 | 17.35 |
| 1988 | 0.0 | 100.0 | 0.0 | 11.61 | 10.29 | 9.30 | 8.56 | 15.69 |
| 1988 | 100.0 | 0.0 | 100.0 | 94.31 | 56.24 | 32.61 | 16.53 | 12.65 |
| 1988 | 50.0 | 0.0 | 50.0 | 44.65 | 28.33 | 18.02 | 10.94 | 15.22 |
| 1988 | 0.0 | 50.0 | 0.0 | 13.25 | 10.88 | 9.17 | 7.91 | 16.37 |
| 1988 | 50.0 | 50.0 | 50.0 | 52.96 | 33.27 | 20.96 | 12.55 | 14.17 |
| 1988 | 20.6 | 27.3 | 20.6 | 26.13 | 18.04 | 12.79 | 9.13 | 15.93 |
| 1990 | 0.0 | 0.0 | 0.0 | 13.15 | 9.85 | 7.58 | 5.99 | 13.05 |
| 1990 | 0.0 | 100.0 | 0.0 | 10.67 | 9.05 | 7.83 | 6.91 | 12.06 |
| 1990 | 100.0 | 0.0 | 100.0 | 82.23 | 49.18 | 28.34 | 13.59 | 10.40 |
| 1990 | 50.0 | 0.0 | 50.0 | 39.05 | 24.56 | 15.31 | 8.76 | 11.77 |
| 1990 | 0.0 | 50.0 | 0.0 | 11.92 | 9.34 | 7.53 | 6.23 | 12.39 |
| 1990 | 50.0 | 50.0 | 50.0 | 46.45 | 29.12 | 18.09 | 10.25 | 11.23 |
| 1990 | 20.6 | 27.3 | 20.6 | 23.05 | 15.57 | 10.70 | 7.25 | 12.16 |
| 1995 | 0.0 | 0.0 | 0.0 | 11.08 | 7.56 | 5.28 | 3.79 | 6.62 |
| 1995 | 0.0 | 100.0 | 0.0 | 9.58 | 7.53 | 5.99 | 4.83 | 7.06 |
| 1995 | 100.0 | 0.0 | 100.0 | 64.70 | 39.01 | 22.36 | 9.71 | 7.48 |
| 1995 | 50.0 | 0.0 | 50.0 | 31.15 | 19.32 | 11.65 | 5.96 | 6.81 |
| 1995 | 0.0 | 50.0 | 0.0 | 10.24 | 7.38 | 5.44 | 4.11 | 6.64 |
| 1995 | 50.0 | 50.0 | 50.0 | 37.14 | 23.27 | 14.18 | 7.27 | 7.27 |
| 1995 | 20.6 | 27.3 | 20.6 | 18.81 | 12.26 | 7.96 | 4.85 | 6.70 |
| 2000 | 0.0 | 0.0 | 0.0 | 10.35 | 6.83 | 4.59 | 3.16 | 4.51 |
| 2000 | 0.0 | 100.0 | 0.0 | 9.10 | 6.98 | 5.39 | 4.19 | 5.44 |
| 2000 | 100.0 | 0.0 | 100.0 | 59.20 | 35.76 | 20.43 | 8.48 | 6.55 |
| 2000 | 50.0 | 0.0 | 50.0 | 28.68 | 17.68 | 10.52 | 5.12 | 5.19 |
| 2000 | 0.0 | 50.0 | 0.0 | 9.62 | 6.72 | 4.79 | 3.49 | 4.77 |
| 2000 | 50.0 | 50.0 | 50.0 | 34.15 | 21.37 | 12.91 | 6.34 | 6.00 |
| 2000 | 20.6 | 27.3 | 20.6 | 17.43 | 11.19 | 7.11 | 4.13 | 4.93 |

TABLE 11 : CO AT 50.0 MPH.

## TABLE 12

## LOW ALTITUDE

## CO EMISSION FACTORS (GRAMS/MILE) AT 55.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | Combined for Eight Vehicle Types @ Ambient Temperature 0 F | 25 F | 50 F | 75 F | 100 F |
|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 24.89 | 22.51 | 20.54 | 18.90 | 35.68 |
| 1980 | 0.0 | 100.0 | 0.0 | 19.66 | 19.66 | 19.77 | 20.00 | 35.97 |
| 1980 | 100.0 | 0.0 | 100.0 | 158.52 | 95.41 | 58.42 | 36.50 | 26.95 |
| 1980 | 50.0 | 0.0 | 50.0 | 76.47 | 50.59 | 35.07 | 25.59 | 31.85 |
| 1980 | 0.0 | 50.0 | 0.0 | 22.62 | 21.21 | 20.07 | 19.19 | 35.36 |
| 1980 | 50.0 | 50.0 | 50.0 | 89.09 | 57.53 | 39.09 | 28.25 | 31.46 |
| 1980 | 20.6 | 27.3 | 20.6 | 44.72 | 33.27 | 26.22 | 21.78 | 33.93 |
| 1985 | 0.0 | 0.0 | 0.0 | 16.96 | 14.45 | 12.51 | 10.99 | 23.73 |
| 1985 | 0.0 | 100.0 | 0.0 | 13.11 | 12.42 | 11.93 | 11.59 | 21.76 |
| 1985 | 100.0 | 0.0 | 100.0 | 103.65 | 61.97 | 36.87 | 20.92 | 16.91 |
| 1985 | 50.0 | 0.0 | 50.0 | 49.87 | 32.43 | 21.67 | 14.67 | 20.73 |
| 1985 | 0.0 | 50.0 | 0.0 | 15.23 | 13.48 | 12.13 | 11.10 | 22.59 |
| 1985 | 50.0 | 50.0 | 50.0 | 58.28 | 37.20 | 24.40 | 16.26 | 19.34 |
| 1985 | 20.6 | 27.3 | 20.6 | 29.46 | 21.26 | 16.04 | 12.54 | 21.87 |
| 1988 | 0.0 | 0.0 | 0.0 | 13.19 | 10.53 | 8.60 | 7.18 | 15.77 |
| 1988 | 0.0 | 100.0 | 0.0 | 10.45 | 9.33 | 8.49 | 7.85 | 14.30 |
| 1988 | 100.0 | 0.0 | 100.0 | 80.27 | 48.05 | 28.11 | 14.62 | 11.59 |
| 1988 | 50.0 | 0.0 | 50.0 | 38.47 | 24.62 | 15.89 | 9.91 | 13.88 |
| 1988 | 0.0 | 50.0 | 0.0 | 11.90 | 9.89 | 8.42 | 7.33 | 14.91 |
| 1988 | 50.0 | 50.0 | 50.0 | 45.36 | 28.69 | 18.30 | 11.24 | 12.95 |
| 1988 | 20.6 | 27.3 | 20.6 | 22.81 | 15.93 | 11.47 | 8.37 | 14.52 |
| 1990 | 0.0 | 0.0 | 0.0 | 11.51 | 8.75 | 6.84 | 5.49 | 11.70 |
| 1990 | 0.0 | 100.0 | 0.0 | 9.38 | 8.02 | 7.00 | 6.22 | 10.80 |
| 1990 | 100.0 | 0.0 | 100.0 | 68.75 | 41.26 | 23.97 | 11.79 | 9.33 |
| 1990 | 50.0 | 0.0 | 50.0 | 33.02 | 20.94 | 13.23 | 7.79 | 10.56 |
| 1990 | 0.0 | 50.0 | 0.0 | 10.46 | 8.31 | 6.78 | 5.68 | 11.12 |
| 1990 | 50.0 | 50.0 | 50.0 | 39.06 | 24.64 | 15.48 | 9.00 | 10.07 |
| 1990 | 20.6 | 27.3 | 20.6 | 19.72 | 13.48 | 9.41 | 6.53 | 10.92 |
| 1995 | 0.0 | 0.0 | 0.0 | 9.35 | 6.47 | 4.60 | 3.37 | 5.78 |
| 1995 | 0.0 | 100.0 | 0.0 | 8.13 | 6.44 | 5.17 | 4.21 | 6.12 |
| 1995 | 100.0 | 0.0 | 100.0 | 52.64 | 31.85 | 18.38 | 8.16 | 6.44 |
| 1995 | 50.0 | 0.0 | 50.0 | 25.57 | 15.97 | 9.74 | 5.12 | 5.92 |
| 1995 | 0.0 | 50.0 | 0.0 | 8.67 | 6.32 | 4.73 | 3.63 | 5.79 |
| 1995 | 50.0 | 50.0 | 50.0 | 30.38 | 19.15 | 11.78 | 6.18 | 6.28 |
| 1995 | 20.6 | 27.3 | 20.6 | 15.60 | 10.26 | 6.76 | 4.22 | 5.84 |
| 2000 | 0.0 | 0.0 | 0.0 | 8.64 | 5.78 | 3.95 | 2.78 | 3.91 |
| 2000 | 0.0 | 100.0 | 0.0 | 7.65 | 5.91 | 4.60 | 3.62 | 4.67 |
| 2000 | 100.0 | 0.0 | 100.0 | 47.91 | 29.04 | 16.70 | 7.07 | 5.57 |
| 2000 | 50.0 | 0.0 | 50.0 | 23.38 | 14.50 | 8.72 | 4.36 | 4.46 |
| 2000 | 0.0 | 50.0 | 0.0 | 8.06 | 5.70 | 4.11 | 3.04 | 4.12 |
| 2000 | 50.0 | 50.0 | 50.0 | 27.78 | 17.47 | 10.65 | 5.34 | 5.12 |
| 2000 | 20.6 | 27.3 | 20.6 | 14.34 | 9.29 | 5.98 | 3.56 | 4.25 |

TABLE 12 : CO AT 55.0 MPH.

## TABLE 13

## LOW ALTITUDE

## NOx EMISSION FACTORS (GRAMS/MILE) AT 5.0 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types @ Ambient Temperature | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 5.89 | 5.45 | 5.07 | 4.75 | 4.15 |
| 1980 | 0.0 | 100.0 | 0.0 | 7.20 | 6.65 | 6.18 | 5.77 | 4.79 |
| 1980 | 100.0 | 0.0 | 100.0 | 6.40 | 6.15 | 5.95 | 5.79 | 5.02 |
| 1980 | 50.0 | 0.0 | 50.0 | 6.19 | 5.85 | 5.56 | 5.33 | 4.64 |
| 1980 | 0.0 | 50.0 | 0.0 | 6.63 | 6.13 | 5.70 | 5.33 | 4.51 |
| 1980 | 50.0 | 50.0 | 50.0 | 6.80 | 6.40 | 6.06 | 5.78 | 4.90 |
| 1980 | 20.6 | 27.3 | 20.6 | 6.42 | 5.99 | 5.62 | 5.31 | 4.55 |
| 1985 | 0.0 | 0.0 | 0.0 | 4.66 | 4.30 | 3.98 | 3.71 | 3.07 |
| 1985 | 0.0 | 100.0 | 0.0 | 5.91 | 5.40 | 4.97 | 4.60 | 3.60 |
| 1985 | 100.0 | 0.0 | 100.0 | 5.90 | 5.45 | 5.08 | 4.77 | 3.63 |
| 1985 | 50.0 | 0.0 | 50.0 | 5.28 | 4.87 | 4.53 | 4.25 | 3.36 |
| 1985 | 0.0 | 50.0 | 0.0 | 5.30 | 4.87 | 4.49 | 4.17 | 3.35 |
| 1985 | 50.0 | 50.0 | 50.0 | 5.90 | 5.43 | 5.02 | 4.68 | 3.61 |
| 1985 | 20.6 | 27.3 | 20.6 | 5.27 | 4.85 | 4.49 | 4.18 | 3.34 |
| 1988 | 0.0 | 0.0 | 0.0 | 4.14 | 3.78 | 3.48 | 3.22 | 2.51 |
| 1988 | 0.0 | 100.0 | 0.0 | 5.43 | 4.88 | 4.42 | 4.03 | 2.99 |
| 1988 | 100.0 | 0.0 | 100.0 | 5.54 | 5.04 | 4.61 | 4.26 | 2.98 |
| 1988 | 50.0 | 0.0 | 50.0 | 4.82 | 4.39 | 4.03 | 3.73 | 2.74 |
| 1988 | 0.0 | 50.0 | 0.0 | 4.78 | 4.33 | 3.95 | 3.63 | 2.75 |
| 1988 | 50.0 | 50.0 | 50.0 | 5.49 | 4.96 | 4.52 | 4.15 | 2.99 |
| 1988 | 20.6 | 27.3 | 20.6 | 4.77 | 4.33 | 3.96 | 3.65 | 2.74 |
| 1990 | 0.0 | 0.0 | 0.0 | 3.84 | 3.48 | 3.18 | 2.93 | 2.17 |
| 1990 | 0.0 | 100.0 | 0.0 | 5.18 | 4.59 | 4.10 | 3.69 | 2.63 |
| 1990 | 100.0 | 0.0 | 100.0 | 5.23 | 4.73 | 4.30 | 3.94 | 2.61 |
| 1990 | 50.0 | 0.0 | 50.0 | 4.50 | 4.08 | 3.72 | 3.41 | 2.38 |
| 1990 | 0.0 | 50.0 | 0.0 | 4.48 | 4.02 | 3.63 | 3.30 | 2.39 |
| 1990 | 50.0 | 50.0 | 50.0 | 5.21 | 4.66 | 4.20 | 3.82 | 2.62 |
| 1990 | 20.6 | 27.3 | 20.6 | 4.46 | 4.02 | 3.65 | 3.33 | 2.38 |
| 1995 | 0.0 | 0.0 | 0.0 | 3.48 | 3.14 | 2.86 | 2.61 | 1.78 |
| 1995 | 0.0 | 100.0 | 0.0 | 4.93 | 4.27 | 3.73 | 3.28 | 2.21 |
| 1995 | 100.0 | 0.0 | 100.0 | 4.78 | 4.31 | 3.91 | 3.56 | 2.20 |
| 1995 | 50.0 | 0.0 | 50.0 | 4.09 | 3.69 | 3.35 | 3.05 | 1.98 |
| 1995 | 0.0 | 50.0 | 0.0 | 4.16 | 3.67 | 3.26 | 2.92 | 1.98 |
| 1995 | 50.0 | 50.0 | 50.0 | 4.86 | 4.29 | 3.82 | 3.42 | 2.20 |
| 1995 | 20.6 | 27.3 | 20.6 | 4.10 | 3.65 | 3.28 | 2.96 | 1.97 |
| 2000 | 0.0 | 0.0 | 0.0 | 3.33 | 3.01 | 2.73 | 2.49 | 1.65 |
| 2000 | 0.0 | 100.0 | 0.0 | 4.81 | 4.12 | 3.57 | 3.12 | 2.06 |
| 2000 | 100.0 | 0.0 | 100.0 | 4.54 | 4.11 | 3.73 | 3.41 | 2.07 |
| 2000 | 50.0 | 0.0 | 50.0 | 3.89 | 3.51 | 3.19 | 2.91 | 1.84 |
| 2000 | 0.0 | 50.0 | 0.0 | 4.01 | 3.52 | 3.11 | 2.78 | 1.84 |
| 2000 | 50.0 | 50.0 | 50.0 | 4.67 | 4.12 | 3.65 | 3.26 | 2.06 |
| 2000 | 20.6 | 27.3 | 20.6 | 3.93 | 3.50 | 3.13 | 2.82 | 1.83 |

TABLE 13 : NOx AT 5.0 MPH.

## TABLE 14

## LOW ALTITUDE

## NOx EMISSION FACTORS (GRAMS/MILE) AT 10.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types @ Ambient Temperature | | | | |
|---|---|---|---|---|---|---|---|---|
| | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 5.34 | 4.93 | 4.58 | 4.28 | 3.69 |
| 1980 | 0.0 | 100.0 | 0.0 | 6.60 | 6.09 | 5.65 | 5.26 | 4.31 |
| 1980 | 100.0 | 0.0 | 100.0 | 5.83 | 5.60 | 5.41 | 5.27 | 4.51 |
| 1980 | 50.0 | 0.0 | 50.0 | 5.63 | 5.31 | 5.05 | 4.84 | 4.16 |
| 1980 | 0.0 | 50.0 | 0.0 | 6.05 | 5.58 | 5.18 | 4.83 | 4.04 |
| 1980 | 50.0 | 50.0 | 50.0 | 6.21 | 5.84 | 5.53 | 5.27 | 4.41 |
| 1980 | 20.6 | 27.3 | 20.6 | 5.85 | 5.45 | 5.10 | 4.81 | 4.08 |
| 1985 | 0.0 | 0.0 | 0.0 | 4.21 | 3.86 | 3.57 | 3.32 | 2.71 |
| 1985 | 0.0 | 100.0 | 0.0 | 5.37 | 4.90 | 4.50 | 4.16 | 3.21 |
| 1985 | 100.0 | 0.0 | 100.0 | 5.34 | 4.93 | 4.59 | 4.30 | 3.23 |
| 1985 | 50.0 | 0.0 | 50.0 | 4.77 | 4.40 | 4.08 | 3.82 | 2.99 |
| 1985 | 0.0 | 50.0 | 0.0 | 4.81 | 4.40 | 4.05 | 3.76 | 2.98 |
| 1985 | 50.0 | 50.0 | 50.0 | 5.36 | 4.92 | 4.54 | 4.23 | 3.22 |
| 1985 | 20.6 | 27.3 | 20.6 | 4.77 | 4.38 | 4.05 | 3.77 | 2.97 |
| 1988 | 0.0 | 0.0 | 0.0 | 3.72 | 3.39 | 3.11 | 2.87 | 2.20 |
| 1988 | 0.0 | 100.0 | 0.0 | 4.91 | 4.41 | 3.99 | 3.63 | 2.66 |
| 1988 | 100.0 | 0.0 | 100.0 | 5.00 | 4.54 | 4.15 | 3.82 | 2.64 |
| 1988 | 50.0 | 0.0 | 50.0 | 4.34 | 3.95 | 3.62 | 3.34 | 2.42 |
| 1988 | 0.0 | 50.0 | 0.0 | 4.31 | 3.90 | 3.55 | 3.25 | 2.43 |
| 1988 | 50.0 | 50.0 | 50.0 | 4.95 | 4.47 | 4.07 | 3.73 | 2.65 |
| 1988 | 20.6 | 27.3 | 20.6 | 4.30 | 3.90 | 3.56 | 3.27 | 2.42 |
| 1990 | 0.0 | 0.0 | 0.0 | 3.44 | 3.12 | 2.84 | 2.60 | 1.90 |
| 1990 | 0.0 | 100.0 | 0.0 | 4.67 | 4.13 | 3.68 | 3.31 | 2.32 |
| 1990 | 100.0 | 0.0 | 100.0 | 4.71 | 4.25 | 3.86 | 3.53 | 2.31 |
| 1990 | 50.0 | 0.0 | 50.0 | 4.04 | 3.66 | 3.33 | 3.05 | 2.10 |
| 1990 | 0.0 | 50.0 | 0.0 | 4.03 | 3.61 | 3.25 | 2.95 | 2.11 |
| 1990 | 50.0 | 50.0 | 50.0 | 4.69 | 4.19 | 3.77 | 3.42 | 2.32 |
| 1990 | 20.6 | 27.3 | 20.6 | 4.01 | 3.61 | 3.26 | 2.98 | 2.09 |
| 1995 | 0.0 | 0.0 | 0.0 | 3.10 | 2.80 | 2.53 | 2.31 | 1.55 |
| 1995 | 0.0 | 100.0 | 0.0 | 4.41 | 3.81 | 3.32 | 2.92 | 1.93 |
| 1995 | 100.0 | 0.0 | 100.0 | 4.27 | 3.85 | 3.48 | 3.17 | 1.93 |
| 1995 | 50.0 | 0.0 | 50.0 | 3.65 | 3.29 | 2.98 | 2.71 | 1.72 |
| 1995 | 0.0 | 50.0 | 0.0 | 3.71 | 3.27 | 2.90 | 2.59 | 1.73 |
| 1995 | 50.0 | 50.0 | 50.0 | 4.34 | 3.83 | 3.40 | 3.04 | 1.93 |
| 1995 | 20.6 | 27.3 | 20.6 | 3.66 | 3.26 | 2.92 | 2.63 | 1.72 |
| 2000 | 0.0 | 0.0 | 0.0 | 2.96 | 2.67 | 2.41 | 2.20 | 1.43 |
| 2000 | 0.0 | 100.0 | 0.0 | 4.29 | 3.67 | 3.17 | 2.76 | 1.79 |
| 2000 | 100.0 | 0.0 | 100.0 | 4.05 | 3.66 | 3.32 | 3.02 | 1.80 |
| 2000 | 50.0 | 0.0 | 50.0 | 3.46 | 3.12 | 2.83 | 2.58 | 1.60 |
| 2000 | 0.0 | 50.0 | 0.0 | 3.57 | 3.13 | 2.76 | 2.46 | 1.60 |
| 2000 | 50.0 | 50.0 | 50.0 | 4.17 | 3.67 | 3.24 | 2.89 | 1.80 |
| 2000 | 20.6 | 27.3 | 20.6 | 3.50 | 3.11 | 2.78 | 2.50 | 1.59 |

TABLE 14 : NOx AT 10.0 MPH.

## TABLE 15

## LOW ALTITUDE

## NOx EMISSION FACTORS (GRAMS/MILE) AT 19.6 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types @ Ambient Temperature | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 5.10 | 4.68 | 4.32 | 4.01 | 3.39 |
| 1980 | 0.0 | 100.0 | 0.0 | 6.42 | 5.89 | 5.44 | 5.05 | 4.04 |
| 1980 | 100.0 | 0.0 | 100.0 | 5.55 | 5.34 | 5.17 | 5.05 | 4.24 |
| 1980 | 50.0 | 0.0 | 50.0 | 5.38 | 5.07 | 4.81 | 4.60 | 3.88 |
| 1980 | 0.0 | 50.0 | 0.0 | 5.85 | 5.37 | 4.96 | 4.60 | 3.76 |
| 1980 | 50.0 | 50.0 | 50.0 | 5.98 | 5.62 | 5.31 | 5.05 | 4.14 |
| 1980 | 20.6 | 27.3 | 20.6 | 5.63 | 5.22 | 4.87 | 4.57 | 3.80 |
| 1985 | 0.0 | 0.0 | 0.0 | 3.84 | 3.51 | 3.23 | 2.99 | 2.40 |
| 1985 | 0.0 | 100.0 | 0.0 | 4.96 | 4.52 | 4.14 | 3.81 | 2.90 |
| 1985 | 100.0 | 0.0 | 100.0 | 4.86 | 4.49 | 4.18 | 3.93 | 2.91 |
| 1985 | 50.0 | 0.0 | 50.0 | 4.35 | 4.01 | 3.72 | 3.48 | 2.68 |
| 1985 | 0.0 | 50.0 | 0.0 | 4.43 | 4.04 | 3.71 | 3.42 | 2.67 |
| 1985 | 50.0 | 50.0 | 50.0 | 4.91 | 4.50 | 4.16 | 3.87 | 2.90 |
| 1985 | 20.6 | 27.3 | 20.6 | 4.37 | 4.00 | 3.69 | 3.43 | 2.66 |
| 1988 | 0.0 | 0.0 | 0.0 | 3.32 | 3.01 | 2.75 | 2.53 | 1.91 |
| 1988 | 0.0 | 100.0 | 0.0 | 4.41 | 3.95 | 3.57 | 3.24 | 2.33 |
| 1988 | 100.0 | 0.0 | 100.0 | 4.45 | 4.04 | 3.69 | 3.40 | 2.32 |
| 1988 | 50.0 | 0.0 | 50.0 | 3.87 | 3.52 | 3.22 | 2.97 | 2.12 |
| 1988 | 0.0 | 50.0 | 0.0 | 3.86 | 3.48 | 3.16 | 2.89 | 2.13 |
| 1988 | 50.0 | 50.0 | 50.0 | 4.43 | 4.00 | 3.63 | 3.32 | 2.33 |
| 1988 | 20.6 | 27.3 | 20.6 | 3.84 | 3.48 | 3.17 | 2.91 | 2.11 |
| 1990 | 0.0 | 0.0 | 0.0 | 3.03 | 2.74 | 2.49 | 2.27 | 1.63 |
| 1990 | 0.0 | 100.0 | 0.0 | 4.12 | 3.65 | 3.25 | 2.92 | 2.01 |
| 1990 | 100.0 | 0.0 | 100.0 | 4.14 | 3.73 | 3.39 | 3.10 | 1.99 |
| 1990 | 50.0 | 0.0 | 50.0 | 3.56 | 3.22 | 2.92 | 2.67 | 1.81 |
| 1990 | 0.0 | 50.0 | 0.0 | 3.56 | 3.18 | 2.86 | 2.59 | 1.82 |
| 1990 | 50.0 | 50.0 | 50.0 | 4.13 | 3.69 | 3.32 | 3.01 | 2.00 |
| 1990 | 20.6 | 27.3 | 20.6 | 3.54 | 3.18 | 2.87 | 2.61 | 1.81 |
| 1995 | 0.0 | 0.0 | 0.0 | 2.67 | 2.40 | 2.17 | 1.97 | 1.29 |
| 1995 | 0.0 | 100.0 | 0.0 | 3.79 | 3.27 | 2.85 | 2.50 | 1.62 |
| 1995 | 100.0 | 0.0 | 100.0 | 3.67 | 3.31 | 2.99 | 2.71 | 1.61 |
| 1995 | 50.0 | 0.0 | 50.0 | 3.14 | 2.82 | 2.55 | 2.32 | 1.44 |
| 1995 | 0.0 | 50.0 | 0.0 | 3.19 | 2.81 | 2.49 | 2.22 | 1.45 |
| 1995 | 50.0 | 50.0 | 50.0 | 3.73 | 3.29 | 2.92 | 2.61 | 1.62 |
| 1995 | 20.6 | 27.3 | 20.6 | 3.15 | 2.79 | 2.50 | 2.25 | 1.44 |
| 2000 | 0.0 | 0.0 | 0.0 | 2.52 | 2.27 | 2.05 | 1.86 | 1.18 |
| 2000 | 0.0 | 100.0 | 0.0 | 3.66 | 3.13 | 2.70 | 2.34 | 1.49 |
| 2000 | 100.0 | 0.0 | 100.0 | 3.45 | 3.12 | 2.82 | 2.57 | 1.50 |
| 2000 | 50.0 | 0.0 | 50.0 | 2.95 | 2.66 | 2.41 | 2.19 | 1.32 |
| 2000 | 0.0 | 50.0 | 0.0 | 3.05 | 2.66 | 2.35 | 2.08 | 1.32 |
| 2000 | 50.0 | 50.0 | 50.0 | 3.56 | 3.12 | 2.76 | 2.45 | 1.49 |
| 2000 | 20.6 | 27.3 | 20.6 | 2.98 | 2.64 | 2.36 | 2.12 | 1.32 |

TABLE 15 : NOx AT 19.6 MPH.

## TABLE 16

## LOW ALTITUDE

## NOx EMISSION FACTORS (GRAMS/MILE) AT 35.0 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types @ Ambient Temperature | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 5.47 | 4.99 | 4.58 | 4.22 | 3.51 |
| 1980 | 0.0 | 100.0 | 0.0 | 6.95 | 6.36 | 5.84 | 5.40 | 4.25 |
| 1980 | 100.0 | 0.0 | 100.0 | 5.91 | 5.69 | 5.52 | 5.39 | 4.50 |
| 1980 | 50.0 | 0.0 | 50.0 | 5.75 | 5.41 | 5.12 | 4.89 | 4.08 |
| 1980 | 0.0 | 50.0 | 0.0 | 6.32 | 5.77 | 5.30 | 4.90 | 3.94 |
| 1980 | 50.0 | 50.0 | 50.0 | 6.43 | 6.02 | 5.68 | 5.39 | 4.37 |
| 1980 | 20.6 | 27.3 | 20.6 | 6.05 | 5.59 | 5.20 | 4.87 | 3.98 |
| 1985 | 0.0 | 0.0 | 0.0 | 3.89 | 3.55 | 3.25 | 3.00 | 2.38 |
| 1985 | 0.0 | 100.0 | 0.0 | 5.05 | 4.60 | 4.21 | 3.87 | 2.91 |
| 1985 | 100.0 | 0.0 | 100.0 | 4.87 | 4.50 | 4.21 | 3.96 | 2.93 |
| 1985 | 50.0 | 0.0 | 50.0 | 4.39 | 4.04 | 3.75 | 3.51 | 2.69 |
| 1985 | 0.0 | 50.0 | 0.0 | 4.51 | 4.11 | 3.76 | 3.47 | 2.67 |
| 1985 | 50.0 | 50.0 | 50.0 | 4.96 | 4.55 | 4.21 | 3.92 | 2.92 |
| 1985 | 20.6 | 27.3 | 20.6 | 4.43 | 4.06 | 3.74 | 3.47 | 2.67 |
| 1988 | 0.0 | 0.0 | 0.0 | 3.25 | 2.95 | 2.69 | 2.47 | 1.84 |
| 1988 | 0.0 | 100.0 | 0.0 | 4.32 | 3.88 | 3.51 | 3.19 | 2.28 |
| 1988 | 100.0 | 0.0 | 100.0 | 4.32 | 3.93 | 3.60 | 3.32 | 2.26 |
| 1988 | 50.0 | 0.0 | 50.0 | 3.78 | 3.44 | 3.15 | 2.90 | 2.06 |
| 1988 | 0.0 | 50.0 | 0.0 | 3.79 | 3.42 | 3.11 | 2.84 | 2.07 |
| 1988 | 50.0 | 50.0 | 50.0 | 4.32 | 3.90 | 3.55 | 3.26 | 2.27 |
| 1988 | 20.6 | 27.3 | 20.6 | 3.76 | 3.41 | 3.11 | 2.85 | 2.06 |
| 1990 | 0.0 | 0.0 | 0.0 | 2.91 | 2.63 | 2.39 | 2.18 | 1.55 |
| 1990 | 0.0 | 100.0 | 0.0 | 3.95 | 3.50 | 3.12 | 2.81 | 1.93 |
| 1990 | 100.0 | 0.0 | 100.0 | 3.94 | 3.56 | 3.24 | 2.96 | 1.90 |
| 1990 | 50.0 | 0.0 | 50.0 | 3.41 | 3.08 | 2.80 | 2.56 | 1.72 |
| 1990 | 0.0 | 50.0 | 0.0 | 3.42 | 3.06 | 2.75 | 2.49 | 1.74 |
| 1990 | 50.0 | 50.0 | 50.0 | 3.95 | 3.53 | 3.18 | 2.89 | 1.91 |
| 1990 | 20.6 | 27.3 | 20.6 | 3.39 | 3.05 | 2.76 | 2.51 | 1.72 |
| 1995 | 0.0 | 0.0 | 0.0 | 2.46 | 2.22 | 2.00 | 1.82 | 1.18 |
| 1995 | 0.0 | 100.0 | 0.0 | 3.48 | 3.01 | 2.63 | 2.31 | 1.49 |
| 1995 | 100.0 | 0.0 | 100.0 | 3.37 | 3.04 | 2.74 | 2.49 | 1.47 |
| 1995 | 50.0 | 0.0 | 50.0 | 2.89 | 2.60 | 2.35 | 2.14 | 1.32 |
| 1995 | 0.0 | 50.0 | 0.0 | 2.94 | 2.59 | 2.30 | 2.05 | 1.32 |
| 1995 | 50.0 | 50.0 | 50.0 | 3.43 | 3.02 | 2.68 | 2.40 | 1.48 |
| 1995 | 20.6 | 27.3 | 20.6 | 2.90 | 2.58 | 2.31 | 2.08 | 1.32 |
| 2000 | 0.0 | 0.0 | 0.0 | 2.30 | 2.07 | 1.87 | 1.70 | 1.06 |
| 2000 | 0.0 | 100.0 | 0.0 | 3.31 | 2.83 | 2.45 | 2.13 | 1.34 |
| 2000 | 100.0 | 0.0 | 100.0 | 3.13 | 2.82 | 2.56 | 2.33 | 1.35 |
| 2000 | 50.0 | 0.0 | 50.0 | 2.68 | 2.42 | 2.19 | 1.99 | 1.19 |
| 2000 | 0.0 | 50.0 | 0.0 | 2.77 | 2.42 | 2.14 | 1.90 | 1.19 |
| 2000 | 50.0 | 50.0 | 50.0 | 3.22 | 2.83 | 2.50 | 2.23 | 1.34 |
| 2000 | 20.6 | 27.3 | 20.6 | 2.71 | 2.40 | 2.14 | 1.93 | 1.19 |

TABLE 16 : NOx AT 35.0 MPH.

## TABLE 17

## LOW ALTITUDE

## NOx EMISSION FACTORS (GRAMS/MILE) AT 50.0 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types @ Ambient Temperature | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 6.18 | 5.65 | 5.19 | 4.80 | 4.01 |
| 1980 | 0.0 | 100.0 | 0.0 | 7.81 | 7.16 | 6.59 | 6.10 | 4.83 |
| 1980 | 100.0 | 0.0 | 100.0 | 6.69 | 6.44 | 6.24 | 6.10 | 5.10 |
| 1980 | 50.0 | 0.0 | 50.0 | 6.50 | 6.12 | 5.80 | 5.54 | 4.63 |
| 1980 | 0.0 | 50.0 | 0.0 | 7.12 | 6.52 | 5.99 | 5.55 | 4.48 |
| 1980 | 50.0 | 50.0 | 50.0 | 7.25 | 6.80 | 6.42 | 6.10 | 4.96 |
| 1980 | 20.6 | 27.3 | 20.6 | 6.83 | 6.32 | 5.89 | 5.52 | 4.53 |
| 1985 | 0.0 | 0.0 | 0.0 | 4.43 | 4.05 | 3.72 | 3.44 | 2.75 |
| 1985 | 0.0 | 100.0 | 0.0 | 5.71 | 5.21 | 4.78 | 4.41 | 3.34 |
| 1985 | 100.0 | 0.0 | 100.0 | 5.53 | 5.12 | 4.78 | 4.51 | 3.36 |
| 1985 | 50.0 | 0.0 | 50.0 | 5.00 | 4.60 | 4.28 | 4.00 | 3.08 |
| 1985 | 0.0 | 50.0 | 0.0 | 5.11 | 4.67 | 4.29 | 3.96 | 3.07 |
| 1985 | 50.0 | 50.0 | 50.0 | 5.62 | 5.16 | 4.78 | 4.46 | 3.35 |
| 1985 | 20.6 | 27.3 | 20.6 | 5.04 | 4.62 | 4.26 | 3.96 | 3.06 |
| 1988 | 0.0 | 0.0 | 0.0 | 3.70 | 3.36 | 3.07 | 2.82 | 2.13 |
| 1988 | 0.0 | 100.0 | 0.0 | 4.87 | 4.38 | 3.98 | 3.63 | 2.61 |
| 1988 | 100.0 | 0.0 | 100.0 | 4.88 | 4.44 | 4.07 | 3.77 | 2.58 |
| 1988 | 50.0 | 0.0 | 50.0 | 4.28 | 3.90 | 3.57 | 3.30 | 2.37 |
| 1988 | 0.0 | 50.0 | 0.0 | 4.29 | 3.88 | 3.53 | 3.24 | 2.38 |
| 1988 | 50.0 | 50.0 | 50.0 | 4.87 | 4.41 | 4.02 | 3.70 | 2.60 |
| 1988 | 20.6 | 27.3 | 20.6 | 4.26 | 3.87 | 3.53 | 3.25 | 2.37 |
| 1990 | 0.0 | 0.0 | 0.0 | 3.28 | 2.97 | 2.70 | 2.48 | 1.78 |
| 1990 | 0.0 | 100.0 | 0.0 | 4.41 | 3.92 | 3.51 | 3.17 | 2.20 |
| 1990 | 100.0 | 0.0 | 100.0 | 4.41 | 3.99 | 3.63 | 3.33 | 2.17 |
| 1990 | 50.0 | 0.0 | 50.0 | 3.83 | 3.47 | 3.16 | 2.90 | 1.98 |
| 1990 | 0.0 | 50.0 | 0.0 | 3.83 | 3.44 | 3.11 | 2.82 | 2.00 |
| 1990 | 50.0 | 50.0 | 50.0 | 4.41 | 3.96 | 3.57 | 3.25 | 2.19 |
| 1990 | 20.6 | 27.3 | 20.6 | 3.81 | 3.43 | 3.11 | 2.84 | 1.98 |
| 1995 | 0.0 | 0.0 | 0.0 | 2.73 | 2.46 | 2.23 | 2.04 | 1.35 |
| 1995 | 0.0 | 100.0 | 0.0 | 3.80 | 3.30 | 2.90 | 2.56 | 1.68 |
| 1995 | 100.0 | 0.0 | 100.0 | 3.69 | 3.33 | 3.02 | 2.75 | 1.66 |
| 1995 | 50.0 | 0.0 | 50.0 | 3.18 | 2.87 | 2.60 | 2.37 | 1.50 |
| 1995 | 0.0 | 50.0 | 0.0 | 3.23 | 2.86 | 2.55 | 2.28 | 1.51 |
| 1995 | 50.0 | 50.0 | 50.0 | 3.75 | 3.32 | 2.96 | 2.65 | 1.67 |
| 1995 | 20.6 | 27.3 | 20.6 | 3.19 | 2.84 | 2.55 | 2.31 | 1.50 |
| 2000 | 0.0 | 0.0 | 0.0 | 2.51 | 2.27 | 2.06 | 1.89 | 1.21 |
| 2000 | 0.0 | 100.0 | 0.0 | 3.57 | 3.07 | 2.67 | 2.34 | 1.50 |
| 2000 | 100.0 | 0.0 | 100.0 | 3.38 | 3.06 | 2.78 | 2.54 | 1.51 |
| 2000 | 50.0 | 0.0 | 50.0 | 2.91 | 2.64 | 2.40 | 2.19 | 1.35 |
| 2000 | 0.0 | 50.0 | 0.0 | 3.00 | 2.64 | 2.34 | 2.09 | 1.35 |
| 2000 | 50.0 | 50.0 | 50.0 | 3.47 | 3.07 | 2.72 | 2.44 | 1.50 |
| 2000 | 20.6 | 27.3 | 20.6 | 2.94 | 2.62 | 2.35 | 2.12 | 1.34 |

TABLE 17 : NOx AT 50.0 MPH.

## TABLE 18

## LOW ALTITUDE

## NOx EMISSION FACTORS (GRAMS/MILE) AT 55.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types @ Ambient Temperature | | | | |
|---|---|---|---|---|---|---|---|---|
| | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 6.72 | 6.15 | 5.66 | 5.25 | 4.39 |
| 1980 | 0.0 | 100.0 | 0.0 | 8.46 | 7.76 | 7.16 | 6.63 | 5.27 |
| 1980 | 100.0 | 0.0 | 100.0 | 7.27 | 7.00 | 6.79 | 6.63 | 5.56 |
| 1980 | 50.0 | 0.0 | 50.0 | 7.07 | 6.66 | 6.32 | 6.04 | 5.07 |
| 1980 | 0.0 | 50.0 | 0.0 | 7.72 | 7.08 | 6.52 | 6.04 | 4.91 |
| 1980 | 50.0 | 50.0 | 50.0 | 7.87 | 7.38 | 6.97 | 6.63 | 5.42 |
| 1980 | 20.6 | 27.3 | 20.6 | 7.42 | 6.87 | 6.40 | 6.01 | 4.95 |
| 1985 | 0.0 | 0.0 | 0.0 | 4.84 | 4.42 | 4.07 | 3.77 | 3.03 |
| 1985 | 0.0 | 100.0 | 0.0 | 6.21 | 5.67 | 5.21 | 4.81 | 3.67 |
| 1985 | 100.0 | 0.0 | 100.0 | 6.02 | 5.58 | 5.21 | 4.92 | 3.68 |
| 1985 | 50.0 | 0.0 | 50.0 | 5.44 | 5.02 | 4.67 | 4.37 | 3.39 |
| 1985 | 0.0 | 50.0 | 0.0 | 5.57 | 5.09 | 4.68 | 4.33 | 3.38 |
| 1985 | 50.0 | 50.0 | 50.0 | 6.11 | 5.62 | 5.21 | 4.86 | 3.67 |
| 1985 | 20.6 | 27.3 | 20.6 | 5.49 | 5.04 | 4.65 | 4.32 | 3.37 |
| 1988 | 0.0 | 0.0 | 0.0 | 4.03 | 3.67 | 3.36 | 3.09 | 2.36 |
| 1988 | 0.0 | 100.0 | 0.0 | 5.28 | 4.77 | 4.33 | 3.96 | 2.87 |
| 1988 | 100.0 | 0.0 | 100.0 | 5.30 | 4.83 | 4.43 | 4.10 | 2.84 |
| 1988 | 50.0 | 0.0 | 50.0 | 4.66 | 4.25 | 3.90 | 3.60 | 2.61 |
| 1988 | 0.0 | 50.0 | 0.0 | 4.66 | 4.23 | 3.86 | 3.54 | 2.63 |
| 1988 | 50.0 | 50.0 | 50.0 | 5.29 | 4.80 | 4.38 | 4.03 | 2.86 |
| 1988 | 20.6 | 27.3 | 20.6 | 4.63 | 4.21 | 3.85 | 3.55 | 2.61 |
| 1990 | 0.0 | 0.0 | 0.0 | 3.57 | 3.23 | 2.95 | 2.70 | 1.97 |
| 1990 | 0.0 | 100.0 | 0.0 | 4.77 | 4.25 | 3.82 | 3.45 | 2.42 |
| 1990 | 100.0 | 0.0 | 100.0 | 4.78 | 4.32 | 3.94 | 3.62 | 2.38 |
| 1990 | 50.0 | 0.0 | 50.0 | 4.15 | 3.76 | 3.43 | 3.15 | 2.18 |
| 1990 | 0.0 | 50.0 | 0.0 | 4.16 | 3.74 | 3.38 | 3.08 | 2.20 |
| 1990 | 50.0 | 50.0 | 50.0 | 4.77 | 4.29 | 3.88 | 3.53 | 2.40 |
| 1990 | 20.6 | 27.3 | 20.6 | 4.13 | 3.73 | 3.38 | 3.09 | 2.18 |
| 1995 | 0.0 | 0.0 | 0.0 | 2.94 | 2.66 | 2.42 | 2.21 | 1.49 |
| 1995 | 0.0 | 100.0 | 0.0 | 4.07 | 3.55 | 3.12 | 2.77 | 1.84 |
| 1995 | 100.0 | 0.0 | 100.0 | 3.97 | 3.58 | 3.25 | 2.96 | 1.82 |
| 1995 | 50.0 | 0.0 | 50.0 | 3.42 | 3.09 | 2.81 | 2.57 | 1.65 |
| 1995 | 0.0 | 50.0 | 0.0 | 3.47 | 3.08 | 2.75 | 2.47 | 1.65 |
| 1995 | 50.0 | 50.0 | 50.0 | 4.02 | 3.57 | 3.19 | 2.86 | 1.83 |
| 1995 | 20.6 | 27.3 | 20.6 | 3.43 | 3.06 | 2.76 | 2.50 | 1.64 |
| 2000 | 0.0 | 0.0 | 0.0 | 2.70 | 2.44 | 2.23 | 2.04 | 1.33 |
| 2000 | 0.0 | 100.0 | 0.0 | 3.81 | 3.28 | 2.86 | 2.51 | 1.64 |
| 2000 | 100.0 | 0.0 | 100.0 | 3.61 | 3.27 | 2.98 | 2.72 | 1.64 |
| 2000 | 50.0 | 0.0 | 50.0 | 3.12 | 2.83 | 2.57 | 2.36 | 1.48 |
| 2000 | 0.0 | 50.0 | 0.0 | 3.21 | 2.83 | 2.52 | 2.26 | 1.48 |
| 2000 | 50.0 | 50.0 | 50.0 | 3.71 | 3.28 | 2.92 | 2.62 | 1.64 |
| 2000 | 20.6 | 27.3 | 20.6 | 3.15 | 2.81 | 2.53 | 2.29 | 1.47 |

TABLE 18 : NOx AT 55.0 MPH.

## TABLE 19

## HIGH ALTITUDE

## THC EMISSION FACTORS (GRAMS/MILE) AT 5.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types @ Ambient Temperature | | | | |
|---|---|---|---|---|---|---|---|---|
| | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 23.35 | 21.36 | 19.69 | 18.29 | 22.06 |
| 1980 | 0.0 | 100.0 | 0.0 | 21.98 | 21.62 | 21.36 | 21.18 | 27.66 |
| 1980 | 100.0 | 0.0 | 100.0 | 142.53 | 83.88 | 50.48 | 31.41 | 25.10 |
| 1980 | 50.0 | 0.0 | 50.0 | 72.28 | 46.98 | 32.25 | 23.57 | 23.19 |
| 1980 | 0.0 | 50.0 | 0.0 | 22.64 | 21.33 | 20.26 | 19.37 | 24.20 |
| 1980 | 50.0 | 50.0 | 50.0 | 82.25 | 52.75 | 35.92 | 26.29 | 26.38 |
| 1980 | 20.6 | 27.3 | 20.6 | 42.98 | 31.83 | 25.14 | 21.04 | 23.68 |
| 1985 | 0.0 | 0.0 | 0.0 | 16.58 | 14.56 | 12.93 | 11.61 | 15.51 |
| 1985 | 0.0 | 100.0 | 0.0 | 15.74 | 15.01 | 14.42 | 13.93 | 19.66 |
| 1985 | 100.0 | 0.0 | 100.0 | 122.97 | 66.33 | 37.10 | 21.78 | 18.85 |
| 1985 | 50.0 | 0.0 | 50.0 | 58.73 | 35.05 | 22.45 | 15.55 | 16.67 |
| 1985 | 0.0 | 50.0 | 0.0 | 16.04 | 14.57 | 13.38 | 12.42 | 16.98 |
| 1985 | 50.0 | 50.0 | 50.0 | 69.36 | 40.67 | 25.76 | 17.86 | 19.25 |
| 1985 | 20.6 | 27.3 | 20.6 | 33.52 | 22.94 | 17.07 | 13.66 | 16.78 |
| 1988 | 0.0 | 0.0 | 0.0 | 13.31 | 11.36 | 9.80 | 8.56 | 12.80 |
| 1988 | 0.0 | 100.0 | 0.0 | 13.16 | 12.11 | 11.25 | 10.54 | 16.43 |
| 1988 | 100.0 | 0.0 | 100.0 | 119.67 | 60.27 | 31.56 | 17.44 | 17.13 |
| 1988 | 50.0 | 0.0 | 50.0 | 54.91 | 30.46 | 18.26 | 11.96 | 14.34 |
| 1988 | 0.0 | 50.0 | 0.0 | 13.05 | 11.50 | 10.25 | 9.24 | 14.07 |
| 1988 | 50.0 | 50.0 | 50.0 | 66.42 | 36.19 | 21.41 | 13.99 | 16.78 |
| 1988 | 20.6 | 27.3 | 20.6 | 30.17 | 19.24 | 13.50 | 10.32 | 14.11 |
| 1990 | 0.0 | 0.0 | 0.0 | 11.57 | 9.73 | 8.27 | 7.12 | 9.43 |
| 1990 | 0.0 | 100.0 | 0.0 | 11.83 | 10.65 | 9.67 | 8.87 | 12.39 |
| 1990 | 100.0 | 0.0 | 100.0 | 118.35 | 57.26 | 28.77 | 15.27 | 15.47 |
| 1990 | 50.0 | 0.0 | 50.0 | 53.12 | 28.19 | 16.19 | 10.22 | 11.65 |
| 1990 | 0.0 | 50.0 | 0.0 | 11.49 | 9.94 | 8.71 | 7.71 | 10.45 |
| 1990 | 50.0 | 50.0 | 50.0 | 65.09 | 33.96 | 19.22 | 12.07 | 13.93 |
| 1990 | 20.6 | 27.3 | 20.6 | 28.50 | 17.39 | 11.74 | 8.70 | 10.88 |
| 1995 | 0.0 | 0.0 | 0.0 | 8.80 | 7.24 | 6.01 | 5.06 | 5.93 |
| 1995 | 0.0 | 100.0 | 0.0 | 9.72 | 8.38 | 7.28 | 6.38 | 8.16 |
| 1995 | 100.0 | 0.0 | 100.0 | 112.49 | 50.98 | 23.82 | 11.73 | 13.80 |
| 1995 | 50.0 | 0.0 | 50.0 | 48.98 | 24.14 | 12.85 | 7.58 | 8.90 |
| 1995 | 0.0 | 50.0 | 0.0 | 9.01 | 7.57 | 6.42 | 5.50 | 6.71 |
| 1995 | 50.0 | 50.0 | 50.0 | 61.11 | 29.68 | 15.55 | 9.05 | 10.98 |
| 1995 | 20.6 | 27.3 | 20.6 | 25.33 | 14.32 | 9.02 | 6.33 | 7.57 |
| 2000 | 0.0 | 0.0 | 0.0 | 7.62 | 6.23 | 5.15 | 4.30 | 4.54 |
| 2000 | 0.0 | 100.0 | 0.0 | 8.76 | 7.41 | 6.32 | 5.42 | 6.47 |
| 2000 | 100.0 | 0.0 | 100.0 | 106.29 | 46.96 | 21.30 | 10.17 | 12.87 |
| 2000 | 50.0 | 0.0 | 50.0 | 45.84 | 21.97 | 11.35 | 6.52 | 7.71 |
| 2000 | 0.0 | 50.0 | 0.0 | 7.94 | 6.59 | 5.53 | 4.68 | 5.22 |
| 2000 | 50.0 | 50.0 | 50.0 | 57.52 | 27.19 | 13.81 | 7.79 | 9.67 |
| 2000 | 20.6 | 27.3 | 20.6 | 23.41 | 12.85 | 7.89 | 5.41 | 6.20 |

TABLE 19 : THC AT 5.0 MPH.

## TABLE 20

## HIGH ALTITUDE

## THC EMISSION FACTORS (GRAMS/MILE) AT 10.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | Combined for Eight Vehicle Types ------- @ Ambient Temperature ------- 0 F | 25 F | 50 F | 75 F | 100 F |
|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 14.94 | 13.83 | 12.91 | 12.12 | 14.17 |
| 1980 | 0.0 | 100.0 | 0.0 | 14.20 | 13.98 | 13.81 | 13.69 | 17.23 |
| 1980 | 100.0 | 0.0 | 100.0 | 79.99 | 47.96 | 29.71 | 19.27 | 15.86 |
| 1980 | 50.0 | 0.0 | 50.0 | 41.67 | 27.83 | 19.77 | 15.00 | 14.80 |
| 1980 | 0.0 | 50.0 | 0.0 | 14.55 | 13.82 | 13.21 | 12.71 | 15.34 |
| 1980 | 50.0 | 50.0 | 50.0 | 47.09 | 30.97 | 21.76 | 16.48 | 16.55 |
| 1980 | 20.6 | 27.3 | 20.6 | 25.67 | 19.55 | 15.88 | 13.62 | 15.06 |
| 1985 | 0.0 | 0.0 | 0.0 | 10.40 | 9.30 | 8.41 | 7.69 | 9.80 |
| 1985 | 0.0 | 100.0 | 0.0 | 9.95 | 9.54 | 9.21 | 8.94 | 12.05 |
| 1985 | 100.0 | 0.0 | 100.0 | 67.84 | 37.27 | 21.48 | 13.19 | 11.62 |
| 1985 | 50.0 | 0.0 | 50.0 | 33.18 | 20.38 | 13.56 | 9.82 | 10.44 |
| 1985 | 0.0 | 50.0 | 0.0 | 10.11 | 9.31 | 8.66 | 8.13 | 10.61 |
| 1985 | 50.0 | 50.0 | 50.0 | 38.89 | 23.41 | 15.35 | 11.07 | 11.84 |
| 1985 | 20.6 | 27.3 | 20.6 | 19.55 | 13.83 | 10.65 | 8.80 | 10.50 |
| 1988 | 0.0 | 0.0 | 0.0 | 8.19 | 7.12 | 6.28 | 5.60 | 8.03 |
| 1988 | 0.0 | 100.0 | 0.0 | 8.10 | 7.53 | 7.05 | 6.66 | 9.98 |
| 1988 | 100.0 | 0.0 | 100.0 | 65.33 | 33.43 | 17.99 | 10.38 | 10.36 |
| 1988 | 50.0 | 0.0 | 50.0 | 30.55 | 17.40 | 10.83 | 7.43 | 8.86 |
| 1988 | 0.0 | 50.0 | 0.0 | 8.05 | 7.20 | 6.51 | 5.96 | 8.71 |
| 1988 | 50.0 | 50.0 | 50.0 | 36.72 | 20.48 | 12.52 | 8.52 | 10.17 |
| 1988 | 20.6 | 27.3 | 20.6 | 17.25 | 11.36 | 8.26 | 6.54 | 8.73 |
| 1990 | 0.0 | 0.0 | 0.0 | 7.05 | 6.05 | 5.25 | 4.62 | 5.87 |
| 1990 | 0.0 | 100.0 | 0.0 | 7.19 | 6.54 | 6.01 | 5.57 | 7.47 |
| 1990 | 100.0 | 0.0 | 100.0 | 64.32 | 31.56 | 16.27 | 9.01 | 9.12 |
| 1990 | 50.0 | 0.0 | 50.0 | 29.34 | 15.96 | 9.51 | 6.29 | 7.07 |
| 1990 | 0.0 | 50.0 | 0.0 | 7.01 | 6.16 | 5.49 | 4.94 | 6.43 |
| 1990 | 50.0 | 50.0 | 50.0 | 35.76 | 19.05 | 11.14 | 7.29 | 8.30 |
| 1990 | 20.6 | 27.3 | 20.6 | 16.14 | 10.16 | 7.12 | 5.48 | 6.66 |
| 1995 | 0.0 | 0.0 | 0.0 | 5.31 | 4.46 | 3.79 | 3.27 | 3.75 |
| 1995 | 0.0 | 100.0 | 0.0 | 5.81 | 5.07 | 4.47 | 3.98 | 4.95 |
| 1995 | 100.0 | 0.0 | 100.0 | 60.81 | 27.88 | 13.34 | 6.85 | 7.97 |
| 1995 | 50.0 | 0.0 | 50.0 | 26.82 | 13.51 | 7.46 | 4.63 | 5.34 |
| 1995 | 0.0 | 50.0 | 0.0 | 5.43 | 4.64 | 4.01 | 3.50 | 4.17 |
| 1995 | 50.0 | 50.0 | 50.0 | 33.31 | 16.48 | 8.90 | 5.42 | 6.46 |
| 1995 | 20.6 | 27.3 | 20.6 | 14.16 | 8.25 | 5.40 | 3.95 | 4.62 |
| 2000 | 0.0 | 0.0 | 0.0 | 4.60 | 3.84 | 3.25 | 2.79 | 2.92 |
| 2000 | 0.0 | 100.0 | 0.0 | 5.22 | 4.48 | 3.88 | 3.39 | 3.96 |
| 2000 | 100.0 | 0.0 | 100.0 | 57.40 | 25.65 | 11.91 | 5.94 | 7.40 |
| 2000 | 50.0 | 0.0 | 50.0 | 25.06 | 12.27 | 6.58 | 3.98 | 4.63 |
| 2000 | 0.0 | 50.0 | 0.0 | 4.78 | 4.04 | 3.45 | 2.99 | 3.29 |
| 2000 | 50.0 | 50.0 | 50.0 | 31.31 | 15.07 | 7.90 | 4.67 | 5.68 |
| 2000 | 20.6 | 27.3 | 20.6 | 13.05 | 7.39 | 4.72 | 3.39 | 3.82 |

TABLE 20 : THC AT 10.0 MPH.

## TABLE 21

## HIGH ALTITUDE

## THC EMISSION FACTORS (GRAMS/MILE) AT 19.6 MPH

| Cal. Year | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types @ Ambient Temperature | | | | |
|---|---|---|---|---|---|---|---|---|
| | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 10.38 | 9.74 | 9.21 | 8.76 | 9.95 |
| 1980 | 0.0 | 100.0 | 0.0 | 9.94 | 9.83 | 9.75 | 9.70 | 11.81 |
| 1980 | 100.0 | 0.0 | 100.0 | 49.78 | 30.41 | 19.38 | 13.08 | 11.00 |
| 1980 | 50.0 | 0.0 | 50.0 | 26.60 | 18.24 | 13.37 | 10.50 | 10.35 |
| 1980 | 0.0 | 50.0 | 0.0 | 10.15 | 9.74 | 9.39 | 9.12 | 10.67 |
| 1980 | 50.0 | 50.0 | 50.0 | 29.86 | 20.12 | 14.57 | 11.39 | 11.41 |
| 1980 | 20.6 | 27.3 | 20.6 | 16.89 | 13.21 | 11.01 | 9.66 | 10.50 |
| 1985 | 0.0 | 0.0 | 0.0 | 7.10 | 6.46 | 5.94 | 5.52 | 6.75 |
| 1985 | 0.0 | 100.0 | 0.0 | 6.82 | 6.60 | 6.42 | 6.27 | 8.10 |
| 1985 | 100.0 | 0.0 | 100.0 | 41.26 | 23.12 | 13.73 | 8.80 | 7.84 |
| 1985 | 50.0 | 0.0 | 50.0 | 20.66 | 13.07 | 9.02 | 6.80 | 7.14 |
| 1985 | 0.0 | 50.0 | 0.0 | 6.92 | 6.46 | 6.09 | 5.79 | 7.23 |
| 1985 | 50.0 | 50.0 | 50.0 | 24.04 | 14.86 | 10.07 | 7.53 | 7.97 |
| 1985 | 20.6 | 27.3 | 20.6 | 12.55 | 9.16 | 7.28 | 6.19 | 7.17 |
| 1988 | 0.0 | 0.0 | 0.0 | 5.45 | 4.83 | 4.35 | 3.95 | 5.46 |
| 1988 | 0.0 | 100.0 | 0.0 | 5.40 | 5.07 | 4.80 | 4.58 | 6.63 |
| 1988 | 100.0 | 0.0 | 100.0 | 39.17 | 20.37 | 11.27 | 6.78 | 6.85 |
| 1988 | 50.0 | 0.0 | 50.0 | 18.65 | 10.91 | 7.04 | 5.04 | 5.96 |
| 1988 | 0.0 | 50.0 | 0.0 | 5.37 | 4.88 | 4.49 | 4.17 | 5.87 |
| 1988 | 50.0 | 50.0 | 50.0 | 22.29 | 12.72 | 8.04 | 5.68 | 6.74 |
| 1988 | 20.6 | 27.3 | 20.6 | 10.80 | 7.34 | 5.52 | 4.51 | 5.88 |
| 1990 | 0.0 | 0.0 | 0.0 | 4.64 | 4.06 | 3.60 | 3.23 | 3.96 |
| 1990 | 0.0 | 100.0 | 0.0 | 4.72 | 4.35 | 4.04 | 3.79 | 4.90 |
| 1990 | 100.0 | 0.0 | 100.0 | 38.32 | 19.08 | 10.09 | 5.82 | 5.87 |
| 1990 | 50.0 | 0.0 | 50.0 | 17.76 | 9.90 | 6.11 | 4.22 | 4.66 |
| 1990 | 0.0 | 50.0 | 0.0 | 4.61 | 4.12 | 3.74 | 3.42 | 4.29 |
| 1990 | 50.0 | 50.0 | 50.0 | 21.52 | 11.71 | 7.07 | 4.81 | 5.39 |
| 1990 | 20.6 | 27.3 | 20.6 | 9.98 | 6.48 | 4.70 | 3.74 | 4.42 |
| 1995 | 0.0 | 0.0 | 0.0 | 3.42 | 2.93 | 2.55 | 2.25 | 2.52 |
| 1995 | 0.0 | 100.0 | 0.0 | 3.72 | 3.29 | 2.95 | 2.66 | 3.23 |
| 1995 | 100.0 | 0.0 | 100.0 | 35.96 | 16.67 | 8.15 | 4.35 | 5.00 |
| 1995 | 50.0 | 0.0 | 50.0 | 16.03 | 8.24 | 4.70 | 3.04 | 3.46 |
| 1995 | 0.0 | 50.0 | 0.0 | 3.49 | 3.04 | 2.67 | 2.39 | 2.77 |
| 1995 | 50.0 | 50.0 | 50.0 | 19.84 | 9.98 | 5.55 | 3.51 | 4.11 |
| 1995 | 20.6 | 27.3 | 20.6 | 8.61 | 5.16 | 3.50 | 2.65 | 3.04 |
| 2000 | 0.0 | 0.0 | 0.0 | 2.95 | 2.52 | 2.18 | 1.91 | 1.98 |
| 2000 | 0.0 | 100.0 | 0.0 | 3.31 | 2.89 | 2.55 | 2.26 | 2.59 |
| 2000 | 100.0 | 0.0 | 100.0 | 33.89 | 15.30 | 7.26 | 3.76 | 4.61 |
| 2000 | 50.0 | 0.0 | 50.0 | 14.94 | 7.46 | 4.13 | 2.61 | 2.98 |
| 2000 | 0.0 | 50.0 | 0.0 | 3.05 | 2.63 | 2.30 | 2.03 | 2.20 |
| 2000 | 50.0 | 50.0 | 50.0 | 18.60 | 9.10 | 4.90 | 3.01 | 3.60 |
| 2000 | 20.6 | 27.3 | 20.6 | 7.90 | 4.60 | 3.04 | 2.26 | 2.51 |

TABLE 21 : THC AT 19.6 MPH.

## TABLE 22

## HIGH ALTITUDE

## THC EMISSION FACTORS (GRAMS/MILE) AT 35.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types @ Ambient Temperature | | | | |
|---|---|---|---|---|---|---|---|---|
| | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 7.82 | 7.47 | 7.17 | 6.91 | 7.57 |
| 1980 | 0.0 | 100.0 | 0.0 | 7.56 | 7.53 | 7.51 | 7.50 | 8.76 |
| 1980 | 100.0 | 0.0 | 100.0 | 33.20 | 20.78 | 13.70 | 9.65 | 8.31 |
| 1980 | 50.0 | 0.0 | 50.0 | 18.35 | 12.98 | 9.86 | 8.03 | 7.86 |
| 1980 | 0.0 | 50.0 | 0.0 | 7.69 | 7.47 | 7.29 | 7.14 | 8.04 |
| 1980 | 50.0 | 50.0 | 50.0 | 20.38 | 14.16 | 10.60 | 8.58 | 8.54 |
| 1980 | 20.6 | 27.3 | 20.6 | 12.06 | 9.72 | 8.33 | 7.49 | 7.94 |
| 1985 | 0.0 | 0.0 | 0.0 | 5.08 | 4.74 | 4.46 | 4.23 | 4.89 |
| 1985 | 0.0 | 100.0 | 0.0 | 4.92 | 4.81 | 4.73 | 4.66 | 5.69 |
| 1985 | 100.0 | 0.0 | 100.0 | 25.04 | 14.53 | 9.05 | 6.15 | 5.55 |
| 1985 | 50.0 | 0.0 | 50.0 | 13.06 | 8.65 | 6.28 | 4.98 | 5.13 |
| 1985 | 0.0 | 50.0 | 0.0 | 4.98 | 4.74 | 4.54 | 4.38 | 5.18 |
| 1985 | 50.0 | 50.0 | 50.0 | 14.98 | 9.67 | 6.89 | 5.40 | 5.62 |
| 1985 | 20.6 | 27.3 | 20.6 | 8.29 | 6.34 | 5.25 | 4.62 | 5.15 |
| 1988 | 0.0 | 0.0 | 0.0 | 3.73 | 3.41 | 3.14 | 2.93 | 3.87 |
| 1988 | 0.0 | 100.0 | 0.0 | 3.70 | 3.53 | 3.40 | 3.28 | 4.54 |
| 1988 | 100.0 | 0.0 | 100.0 | 22.65 | 12.17 | 7.06 | 4.53 | 4.66 |
| 1988 | 50.0 | 0.0 | 50.0 | 11.17 | 6.85 | 4.68 | 3.55 | 4.16 |
| 1988 | 0.0 | 50.0 | 0.0 | 3.69 | 3.43 | 3.22 | 3.05 | 4.11 |
| 1988 | 50.0 | 50.0 | 50.0 | 13.17 | 7.85 | 5.23 | 3.91 | 4.60 |
| 1988 | 20.6 | 27.3 | 20.6 | 6.75 | 4.82 | 3.81 | 3.25 | 4.12 |
| 1990 | 0.0 | 0.0 | 0.0 | 3.10 | 2.79 | 2.55 | 2.36 | 2.74 |
| 1990 | 0.0 | 100.0 | 0.0 | 3.14 | 2.95 | 2.79 | 2.66 | 3.27 |
| 1990 | 100.0 | 0.0 | 100.0 | 21.67 | 11.11 | 6.15 | 3.79 | 3.80 |
| 1990 | 50.0 | 0.0 | 50.0 | 10.35 | 6.03 | 3.95 | 2.90 | 3.13 |
| 1990 | 0.0 | 50.0 | 0.0 | 3.09 | 2.83 | 2.62 | 2.46 | 2.93 |
| 1990 | 50.0 | 50.0 | 50.0 | 12.41 | 7.03 | 4.47 | 3.23 | 3.53 |
| 1990 | 20.6 | 27.3 | 20.6 | 6.06 | 4.14 | 3.16 | 2.64 | 3.00 |
| 1995 | 0.0 | 0.0 | 0.0 | 2.21 | 1.95 | 1.74 | 1.58 | 1.73 |
| 1995 | 0.0 | 100.0 | 0.0 | 2.37 | 2.14 | 1.96 | 1.81 | 2.11 |
| 1995 | 100.0 | 0.0 | 100.0 | 19.85 | 9.41 | 4.79 | 2.73 | 3.07 |
| 1995 | 50.0 | 0.0 | 50.0 | 9.05 | 4.83 | 2.92 | 2.02 | 2.24 |
| 1995 | 0.0 | 50.0 | 0.0 | 2.25 | 2.00 | 1.81 | 1.66 | 1.86 |
| 1995 | 50.0 | 50.0 | 50.0 | 11.11 | 5.78 | 3.38 | 2.27 | 2.59 |
| 1995 | 20.6 | 27.3 | 20.6 | 5.02 | 3.16 | 2.26 | 1.80 | 2.01 |
| 2000 | 0.0 | 0.0 | 0.0 | 1.89 | 1.66 | 1.48 | 1.34 | 1.37 |
| 2000 | 0.0 | 100.0 | 0.0 | 2.08 | 1.86 | 1.68 | 1.53 | 1.71 |
| 2000 | 100.0 | 0.0 | 100.0 | 18.63 | 8.58 | 4.23 | 2.34 | 2.80 |
| 2000 | 50.0 | 0.0 | 50.0 | 8.38 | 4.33 | 2.54 | 1.72 | 1.92 |
| 2000 | 0.0 | 50.0 | 0.0 | 1.94 | 1.72 | 1.54 | 1.40 | 1.49 |
| 2000 | 50.0 | 50.0 | 50.0 | 10.36 | 5.22 | 2.96 | 1.94 | 2.25 |
| 2000 | 20.6 | 27.3 | 20.6 | 4.57 | 2.78 | 1.94 | 1.53 | 1.66 |

TABLE 22 : THC AT 35.0 MPH.

## TABLE 23

## HIGH ALTITUDE

## THC EMISSION FACTORS (GRAMS/MILE) AT 50.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | Combined for Eight Vehicle Types @ Ambient Temperature 0 F | 25 F | 50 F | 75 F | 100 F |
|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 7.09 | 6.81 | 6.57 | 6.37 | 6.88 |
| 1980 | 0.0 | 100.0 | 0.0 | 6.87 | 6.86 | 6.85 | 6.86 | 7.89 |
| 1980 | 100.0 | 0.0 | 100.0 | 28.53 | 18.06 | 12.08 | 8.66 | 7.54 |
| 1980 | 50.0 | 0.0 | 50.0 | 16.01 | 11.48 | 8.85 | 7.31 | 7.14 |
| 1980 | 0.0 | 50.0 | 0.0 | 6.98 | 6.81 | 6.67 | 6.56 | 7.28 |
| 1980 | 50.0 | 50.0 | 50.0 | 17.70 | 12.46 | 9.47 | 7.76 | 7.71 |
| 1980 | 20.6 | 27.3 | 20.6 | 10.68 | 8.72 | 7.56 | 6.86 | 7.20 |
| 1985 | 0.0 | 0.0 | 0.0 | 4.51 | 4.24 | 4.03 | 3.85 | 4.36 |
| 1985 | 0.0 | 100.0 | 0.0 | 4.38 | 4.30 | 4.24 | 4.20 | 5.01 |
| 1985 | 100.0 | 0.0 | 100.0 | 20.57 | 12.15 | 7.74 | 5.40 | 4.90 |
| 1985 | 50.0 | 0.0 | 50.0 | 10.95 | 7.41 | 5.51 | 4.46 | 4.56 |
| 1985 | 0.0 | 50.0 | 0.0 | 4.43 | 4.25 | 4.10 | 3.98 | 4.60 |
| 1985 | 50.0 | 50.0 | 50.0 | 12.48 | 8.23 | 5.99 | 4.80 | 4.96 |
| 1985 | 20.6 | 27.3 | 20.6 | 7.10 | 5.54 | 4.67 | 4.17 | 4.57 |
| 1988 | 0.0 | 0.0 | 0.0 | 3.25 | 3.00 | 2.80 | 2.64 | 3.42 |
| 1988 | 0.0 | 100.0 | 0.0 | 3.22 | 3.10 | 3.00 | 2.91 | 3.96 |
| 1988 | 100.0 | 0.0 | 100.0 | 18.12 | 9.91 | 5.90 | 3.90 | 4.05 |
| 1988 | 50.0 | 0.0 | 50.0 | 9.11 | 5.72 | 4.01 | 3.12 | 3.65 |
| 1988 | 0.0 | 50.0 | 0.0 | 3.21 | 3.02 | 2.86 | 2.73 | 3.61 |
| 1988 | 50.0 | 50.0 | 50.0 | 10.67 | 6.50 | 4.45 | 3.41 | 4.00 |
| 1988 | 20.6 | 27.3 | 20.6 | 5.62 | 4.12 | 3.33 | 2.89 | 3.61 |
| 1990 | 0.0 | 0.0 | 0.0 | 2.67 | 2.44 | 2.25 | 2.10 | 2.40 |
| 1990 | 0.0 | 100.0 | 0.0 | 2.70 | 2.56 | 2.44 | 2.34 | 2.81 |
| 1990 | 100.0 | 0.0 | 100.0 | 17.13 | 8.92 | 5.07 | 3.22 | 3.22 |
| 1990 | 50.0 | 0.0 | 50.0 | 8.32 | 4.97 | 3.34 | 2.53 | 2.70 |
| 1990 | 0.0 | 50.0 | 0.0 | 2.66 | 2.46 | 2.31 | 2.18 | 2.54 |
| 1990 | 50.0 | 50.0 | 50.0 | 9.91 | 5.74 | 3.75 | 2.78 | 3.01 |
| 1990 | 20.6 | 27.3 | 20.6 | 4.97 | 3.48 | 2.73 | 2.32 | 2.60 |
| 1995 | 0.0 | 0.0 | 0.0 | 1.86 | 1.67 | 1.51 | 1.39 | 1.50 |
| 1995 | 0.0 | 100.0 | 0.0 | 1.99 | 1.82 | 1.68 | 1.57 | 1.80 |
| 1995 | 100.0 | 0.0 | 100.0 | 15.45 | 7.42 | 3.86 | 2.28 | 2.53 |
| 1995 | 50.0 | 0.0 | 50.0 | 7.14 | 3.89 | 2.42 | 1.73 | 1.89 |
| 1995 | 0.0 | 50.0 | 0.0 | 1.89 | 1.71 | 1.56 | 1.45 | 1.60 |
| 1995 | 50.0 | 50.0 | 50.0 | 8.72 | 4.62 | 2.77 | 1.92 | 2.17 |
| 1995 | 20.6 | 27.3 | 20.6 | 4.03 | 2.60 | 1.91 | 1.56 | 1.72 |
| 2000 | 0.0 | 0.0 | 0.0 | 1.59 | 1.41 | 1.27 | 1.17 | 1.19 |
| 2000 | 0.0 | 100.0 | 0.0 | 1.74 | 1.57 | 1.43 | 1.32 | 1.45 |
| 2000 | 100.0 | 0.0 | 100.0 | 14.47 | 6.74 | 3.40 | 1.94 | 2.29 |
| 2000 | 50.0 | 0.0 | 50.0 | 6.58 | 3.47 | 2.09 | 1.46 | 1.61 |
| 2000 | 0.0 | 50.0 | 0.0 | 1.63 | 1.46 | 1.32 | 1.22 | 1.29 |
| 2000 | 50.0 | 50.0 | 50.0 | 8.10 | 4.15 | 2.41 | 1.63 | 1.87 |
| 2000 | 20.6 | 27.3 | 20.6 | 3.65 | 2.28 | 1.63 | 1.31 | 1.41 |

TABLE 23 : THC AT 50.0 MPH.

## TABLE 24

## HIGH ALTITUDE

## THC EMISSION FACTORS (GRAMS/MILE) AT 55.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | Combined for Eight Vehicle Types @ Ambient Temperature 0 F | 25 F | 50 F | 75 F | 100 F |
|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 6.94 | 6.68 | 6.46 | 6.27 | 6.74 |
| 1980 | 0.0 | 100.0 | 0.0 | 6.74 | 6.72 | 6.72 | 6.74 | 7.70 |
| 1980 | 100.0 | 0.0 | 100.0 | 27.44 | 17.44 | 11.72 | 8.45 | 7.38 |
| 1980 | 50.0 | 0.0 | 50.0 | 15.48 | 11.15 | 8.64 | 7.16 | 6.99 |
| 1980 | 0.0 | 50.0 | 0.0 | 6.83 | 6.68 | 6.55 | 6.45 | 7.12 |
| 1980 | 50.0 | 50.0 | 50.0 | 17.09 | 12.08 | 9.22 | 7.59 | 7.54 |
| 1980 | 20.6 | 27.3 | 20.6 | 10.38 | 8.51 | 7.40 | 6.73 | 7.05 |
| 1985 | 0.0 | 0.0 | 0.0 | 4.37 | 4.13 | 3.93 | 3.77 | 4.23 |
| 1985 | 0.0 | 100.0 | 0.0 | 4.25 | 4.18 | 4.12 | 4.08 | 4.84 |
| 1985 | 100.0 | 0.0 | 100.0 | 19.27 | 11.48 | 7.38 | 5.20 | 4.74 |
| 1985 | 50.0 | 0.0 | 50.0 | 10.36 | 7.08 | 5.31 | 4.33 | 4.42 |
| 1985 | 0.0 | 50.0 | 0.0 | 4.29 | 4.13 | 3.99 | 3.88 | 4.45 |
| 1985 | 50.0 | 50.0 | 50.0 | 11.76 | 7.83 | 5.75 | 4.64 | 4.79 |
| 1985 | 20.6 | 27.3 | 20.6 | 6.78 | 5.33 | 4.53 | 4.06 | 4.43 |
| 1988 | 0.0 | 0.0 | 0.0 | 3.12 | 2.89 | 2.71 | 2.57 | 3.30 |
| 1988 | 0.0 | 100.0 | 0.0 | 3.09 | 2.98 | 2.89 | 2.82 | 3.80 |
| 1988 | 100.0 | 0.0 | 100.0 | 16.73 | 9.23 | 5.56 | 3.72 | 3.88 |
| 1988 | 50.0 | 0.0 | 50.0 | 8.49 | 5.39 | 3.83 | 3.39 | 3.51 |
| 1988 | 0.0 | 50.0 | 0.0 | 3.09 | 2.91 | 2.77 | 3.00 | 3.48 |
| 1988 | 50.0 | 50.0 | 50.0 | 9.91 | 6.11 | 4.22 | 3.66 | 3.84 |
| 1988 | 20.6 | 27.3 | 20.6 | 5.30 | 3.92 | 3.20 | 3.15 | 3.48 |
| 1990 | 0.0 | 0.0 | 0.0 | 2.55 | 2.34 | 2.17 | 2.04 | 2.30 |
| 1990 | 0.0 | 100.0 | 0.0 | 2.58 | 2.45 | 2.34 | 2.25 | 2.68 |
| 1990 | 100.0 | 0.0 | 100.0 | 15.69 | 8.24 | 4.74 | 3.06 | 3.05 |
| 1990 | 50.0 | 0.0 | 50.0 | 7.69 | 4.65 | 3.17 | 2.43 | 2.58 |
| 1990 | 0.0 | 50.0 | 0.0 | 2.54 | 2.36 | 2.22 | 2.11 | 2.44 |
| 1990 | 50.0 | 50.0 | 50.0 | 9.13 | 5.35 | 3.54 | 2.66 | 2.87 |
| 1990 | 20.6 | 27.3 | 20.6 | 4.65 | 3.30 | 2.61 | 2.24 | 2.49 |
| 1995 | 0.0 | 0.0 | 0.0 | 1.77 | 1.59 | 1.45 | 1.34 | 1.44 |
| 1995 | 0.0 | 100.0 | 0.0 | 1.88 | 1.73 | 1.60 | 1.50 | 1.71 |
| 1995 | 100.0 | 0.0 | 100.0 | 14.04 | 6.79 | 3.58 | 2.14 | 2.37 |
| 1995 | 50.0 | 0.0 | 50.0 | 6.53 | 3.60 | 2.27 | 1.64 | 1.79 |
| 1995 | 0.0 | 50.0 | 0.0 | 1.80 | 1.63 | 1.50 | 1.39 | 1.54 |
| 1995 | 50.0 | 50.0 | 50.0 | 7.96 | 4.26 | 2.59 | 1.82 | 2.04 |
| 1995 | 20.6 | 27.3 | 20.6 | 3.73 | 2.43 | 1.81 | 1.49 | 1.64 |
| 2000 | 0.0 | 0.0 | 0.0 | 1.50 | 1.34 | 1.22 | 1.12 | 1.15 |
| 2000 | 0.0 | 100.0 | 0.0 | 1.64 | 1.49 | 1.36 | 1.26 | 1.38 |
| 2000 | 100.0 | 0.0 | 100.0 | 13.12 | 6.16 | 3.14 | 1.83 | 2.14 |
| 2000 | 50.0 | 0.0 | 50.0 | 6.01 | 3.21 | 1.96 | 1.39 | 1.53 |
| 2000 | 0.0 | 50.0 | 0.0 | 1.54 | 1.39 | 1.27 | 1.17 | 1.23 |
| 2000 | 50.0 | 50.0 | 50.0 | 7.38 | 3.82 | 2.25 | 1.54 | 1.76 |
| 2000 | 20.6 | 27.3 | 20.6 | 3.36 | 2.13 | 1.55 | 1.26 | 1.35 |

TABLE 24 : THC AT 55.0 MPH.

## TABLE 25

## HIGH ALTITUDE

## CO EMISSION FACTORS (GRAMS/MILE) AT 5.0 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types ------- @ Ambient Temperature ------- | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 281.80 | 248.94 | 222.06 | 199.99 | 417.04 |
| 1980 | 0.0 | 100.0 | 0.0 | 186.74 | 185.75 | 185.90 | 187.20 | 352.65 |
| 1980 | 100.0 | 0.0 | 100.0 | 1738.47 | 1018.19 | 605.49 | 366.64 | 262.06 |
| 1980 | 50.0 | 0.0 | 50.0 | 883.13 | 565.82 | 378.90 | 266.72 | 345.85 |
| 1980 | 0.0 | 50.0 | 0.0 | 237.49 | 218.53 | 203.46 | 191.62 | 384.07 |
| 1980 | 50.0 | 50.0 | 50.0 | 962.60 | 601.97 | 395.70 | 276.92 | 307.36 |
| 1980 | 20.6 | 27.3 | 20.6 | 503.95 | 362.14 | 276.13 | 222.71 | 369.82 |
| 1985 | 0.0 | 0.0 | 0.0 | 234.03 | 189.29 | 156.41 | 131.82 | 306.39 |
| 1985 | 0.0 | 100.0 | 0.0 | 165.90 | 150.92 | 139.77 | 131.64 | 249.35 |
| 1985 | 100.0 | 0.0 | 100.0 | 1316.55 | 783.09 | 465.94 | 265.99 | 199.77 |
| 1985 | 50.0 | 0.0 | 50.0 | 669.28 | 426.97 | 279.24 | 183.94 | 256.50 |
| 1985 | 0.0 | 50.0 | 0.0 | 201.04 | 169.54 | 146.37 | 129.15 | 277.06 |
| 1985 | 50.0 | 50.0 | 50.0 | 741.23 | 467.00 | 302.86 | 198.81 | 224.56 |
| 1985 | 20.6 | 27.3 | 20.6 | 394.18 | 275.77 | 201.16 | 151.64 | 269.88 |
| 1988 | 0.0 | 0.0 | 0.0 | 208.25 | 156.41 | 120.59 | 95.39 | 245.31 |
| 1988 | 0.0 | 100.0 | 0.0 | 154.75 | 131.88 | 114.68 | 101.78 | 201.82 |
| 1988 | 100.0 | 0.0 | 100.0 | 1094.68 | 657.50 | 391.28 | 213.01 | 169.20 |
| 1988 | 50.0 | 0.0 | 50.0 | 560.11 | 354.44 | 226.77 | 140.67 | 208.81 |
| 1988 | 0.0 | 50.0 | 0.0 | 181.41 | 142.66 | 115.34 | 95.83 | 222.33 |
| 1988 | 50.0 | 50.0 | 50.0 | 624.72 | 394.69 | 252.98 | 157.39 | 185.51 |
| 1988 | 20.6 | 27.3 | 20.6 | 337.56 | 229.90 | 161.13 | 114.10 | 217.75 |
| 1990 | 0.0 | 0.0 | 0.0 | 197.59 | 141.69 | 104.22 | 78.74 | 171.17 |
| 1990 | 0.0 | 100.0 | 0.0 | 151.52 | 124.29 | 103.82 | 88.43 | 148.70 |
| 1990 | 100.0 | 0.0 | 100.0 | 974.51 | 590.33 | 352.99 | 188.07 | 138.74 |
| 1990 | 50.0 | 0.0 | 50.0 | 503.65 | 317.76 | 201.26 | 120.68 | 153.77 |
| 1990 | 0.0 | 50.0 | 0.0 | 173.85 | 131.03 | 101.45 | 80.75 | 157.96 |
| 1990 | 50.0 | 50.0 | 50.0 | 563.01 | 357.31 | 228.41 | 138.25 | 143.72 |
| 1990 | 20.6 | 27.3 | 20.6 | 309.82 | 207.86 | 142.36 | 96.94 | 156.77 |
| 1995 | 0.0 | 0.0 | 0.0 | 180.84 | 120.00 | 81.01 | 55.85 | 96.84 |
| 1995 | 0.0 | 100.0 | 0.0 | 146.33 | 113.09 | 88.20 | 69.54 | 99.07 |
| 1995 | 100.0 | 0.0 | 100.0 | 773.48 | 478.51 | 290.60 | 150.01 | 112.12 |
| 1995 | 50.0 | 0.0 | 50.0 | 411.67 | 259.41 | 162.28 | 91.92 | 100.35 |
| 1995 | 0.0 | 50.0 | 0.0 | 162.03 | 113.97 | 81.74 | 59.90 | 95.20 |
| 1995 | 50.0 | 50.0 | 50.0 | 459.91 | 295.80 | 189.40 | 109.77 | 105.60 |
| 1995 | 20.6 | 27.3 | 20.6 | 264.95 | 173.68 | 114.60 | 72.76 | 97.31 |
| 2000 | 0.0 | 0.0 | 0.0 | 170.43 | 110.04 | 71.93 | 47.79 | 68.92 |
| 2000 | 0.0 | 100.0 | 0.0 | 140.30 | 106.25 | 80.85 | 61.88 | 80.07 |
| 2000 | 100.0 | 0.0 | 100.0 | 692.02 | 432.58 | 264.29 | 133.81 | 100.87 |
| 2000 | 50.0 | 0.0 | 50.0 | 372.98 | 235.23 | 146.48 | 80.77 | 79.81 |
| 2000 | 0.0 | 50.0 | 0.0 | 153.62 | 105.49 | 73.56 | 52.18 | 71.56 |
| 2000 | 50.0 | 50.0 | 50.0 | 416.16 | 269.42 | 172.57 | 97.85 | 90.47 |
| 2000 | 20.6 | 27.3 | 20.6 | 244.05 | 158.71 | 103.26 | 63.63 | 74.76 |

TABLE 25 : CO AT 5.0 MPH.

## TABLE 26

## HIGH ALTITUDE

## CO EMISSION FACTORS (GRAMS/MILE) AT 10.0 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types @ Ambient Temperature | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 161.36 | 143.20 | 128.28 | 116.00 | 236.23 |
| 1980 | 0.0 | 100.0 | 0.0 | 109.18 | 108.34 | 108.18 | 108.68 | 202.52 |
| 1980 | 100.0 | 0.0 | 100.0 | 961.85 | 566.91 | 339.84 | 207.91 | 152.18 |
| 1980 | 50.0 | 0.0 | 50.0 | 492.51 | 318.12 | 215.02 | 152.89 | 197.58 |
| 1980 | 0.0 | 50.0 | 0.0 | 137.04 | 126.43 | 117.96 | 111.28 | 218.87 |
| 1980 | 50.0 | 50.0 | 50.0 | 535.51 | 337.63 | 224.01 | 158.30 | 177.35 |
| 1980 | 20.6 | 27.3 | 20.6 | 283.75 | 205.70 | 158.17 | 128.51 | 210.89 |
| 1985 | 0.0 | 0.0 | 0.0 | 130.91 | 106.69 | 88.82 | 75.39 | 171.44 |
| 1985 | 0.0 | 100.0 | 0.0 | 94.03 | 85.75 | 79.57 | 75.03 | 141.13 |
| 1985 | 100.0 | 0.0 | 100.0 | 713.13 | 426.07 | 255.23 | 147.47 | 114.13 |
| 1985 | 50.0 | 0.0 | 50.0 | 365.32 | 234.70 | 154.94 | 103.43 | 144.62 |
| 1985 | 0.0 | 50.0 | 0.0 | 113.06 | 95.94 | 83.29 | 73.84 | 155.83 |
| 1985 | 50.0 | 50.0 | 50.0 | 403.58 | 255.91 | 167.40 | 111.25 | 127.63 |
| 1985 | 20.6 | 27.3 | 20.6 | 217.12 | 153.21 | 112.84 | 85.99 | 151.90 |
| 1988 | 0.0 | 0.0 | 0.0 | 114.52 | 86.71 | 67.43 | 53.81 | 136.19 |
| 1988 | 0.0 | 100.0 | 0.0 | 85.81 | 73.43 | 64.09 | 57.06 | 113.05 |
| 1988 | 100.0 | 0.0 | 100.0 | 587.54 | 354.01 | 211.74 | 116.49 | 95.34 |
| 1988 | 50.0 | 0.0 | 50.0 | 302.44 | 192.43 | 124.08 | 77.95 | 116.60 |
| 1988 | 0.0 | 50.0 | 0.0 | 100.13 | 79.29 | 64.55 | 53.97 | 123.96 |
| 1988 | 50.0 | 50.0 | 50.0 | 336.67 | 213.72 | 137.91 | 86.77 | 104.20 |
| 1988 | 20.6 | 27.3 | 20.6 | 183.56 | 125.91 | 89.01 | 63.75 | 121.46 |
| 1990 | 0.0 | 0.0 | 0.0 | 107.74 | 77.86 | 57.78 | 44.06 | 94.22 |
| 1990 | 0.0 | 100.0 | 0.0 | 83.14 | 68.49 | 57.45 | 49.13 | 82.27 |
| 1990 | 100.0 | 0.0 | 100.0 | 520.79 | 316.31 | 189.94 | 102.15 | 76.84 |
| 1990 | 50.0 | 0.0 | 50.0 | 270.53 | 171.48 | 109.35 | 66.35 | 84.91 |
| 1990 | 0.0 | 50.0 | 0.0 | 95.08 | 72.14 | 56.25 | 45.10 | 87.20 |
| 1990 | 50.0 | 50.0 | 50.0 | 301.96 | 192.40 | 123.70 | 75.64 | 79.56 |
| 1990 | 20.6 | 27.3 | 20.6 | 167.42 | 113.02 | 78.02 | 53.72 | 86.54 |
| 1995 | 0.0 | 0.0 | 0.0 | 97.65 | 65.26 | 44.46 | 31.00 | 53.14 |
| 1995 | 0.0 | 100.0 | 0.0 | 79.37 | 61.60 | 48.27 | 38.26 | 54.35 |
| 1995 | 100.0 | 0.0 | 100.0 | 411.70 | 255.23 | 155.52 | 80.93 | 61.24 |
| 1995 | 50.0 | 0.0 | 50.0 | 219.98 | 139.14 | 87.53 | 50.12 | 55.00 |
| 1995 | 0.0 | 50.0 | 0.0 | 87.68 | 62.06 | 44.84 | 33.15 | 52.28 |
| 1995 | 50.0 | 50.0 | 50.0 | 245.54 | 158.42 | 101.90 | 59.59 | 57.79 |
| 1995 | 20.6 | 27.3 | 20.6 | 142.23 | 93.71 | 62.26 | 39.97 | 53.40 |
| 2000 | 0.0 | 0.0 | 0.0 | 91.78 | 59.66 | 39.36 | 26.46 | 37.88 |
| 2000 | 0.0 | 100.0 | 0.0 | 75.86 | 57.69 | 44.12 | 33.97 | 43.83 |
| 2000 | 100.0 | 0.0 | 100.0 | 368.07 | 230.53 | 141.28 | 72.09 | 54.84 |
| 2000 | 50.0 | 0.0 | 50.0 | 199.08 | 125.99 | 78.86 | 43.96 | 43.66 |
| 2000 | 0.0 | 50.0 | 0.0 | 82.89 | 57.27 | 40.23 | 28.80 | 39.29 |
| 2000 | 50.0 | 50.0 | 50.0 | 221.97 | 144.11 | 92.70 | 53.03 | 49.34 |
| 2000 | 20.6 | 27.3 | 20.6 | 130.79 | 85.46 | 55.97 | 34.87 | 40.98 |

TABLE 26 : CO AT 10.0 MPH.

## TABLE 27

## HIGH ALTITUDE

## CO EMISSION FACTORS (GRAMS/MILE) AT 19.6 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types @ Ambient Temperature | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 102.56 | 91.13 | 81.76 | 74.06 | 150.21 |
| 1980 | 0.0 | 100.0 | 0.0 | 68.24 | 68.10 | 68.37 | 69.05 | 128.92 |
| 1980 | 100.0 | 0.0 | 100.0 | 627.23 | 369.32 | 220.79 | 134.39 | 95.56 |
| 1980 | 50.0 | 0.0 | 50.0 | 320.05 | 206.22 | 138.89 | 98.33 | 125.07 |
| 1980 | 0.0 | 50.0 | 0.0 | 86.57 | 80.06 | 74.91 | 70.88 | 139.20 |
| 1980 | 50.0 | 50.0 | 50.0 | 347.74 | 218.71 | 144.58 | 101.72 | 112.24 |
| 1980 | 20.6 | 27.3 | 20.6 | 182.94 | 132.24 | 101.41 | 82.25 | 133.88 |
| 1985 | 0.0 | 0.0 | 0.0 | 81.73 | 66.51 | 55.30 | 46.89 | 107.06 |
| 1985 | 0.0 | 100.0 | 0.0 | 57.76 | 52.78 | 49.10 | 46.45 | 87.69 |
| 1985 | 100.0 | 0.0 | 100.0 | 456.51 | 272.07 | 162.32 | 93.18 | 70.07 |
| 1985 | 50.0 | 0.0 | 50.0 | 232.84 | 149.02 | 97.88 | 64.92 | 89.75 |
| 1985 | 0.0 | 50.0 | 0.0 | 70.15 | 59.49 | 51.64 | 45.81 | 97.08 |
| 1985 | 50.0 | 50.0 | 50.0 | 257.14 | 162.43 | 105.71 | 69.81 | 78.88 |
| 1985 | 20.6 | 27.3 | 20.6 | 137.27 | 96.45 | 70.72 | 53.66 | 94.50 |
| 1988 | 0.0 | 0.0 | 0.0 | 71.47 | 53.97 | 41.86 | 33.31 | 84.98 |
| 1988 | 0.0 | 100.0 | 0.0 | 52.96 | 45.30 | 39.55 | 35.25 | 70.19 |
| 1988 | 100.0 | 0.0 | 100.0 | 373.70 | 224.67 | 133.92 | 73.25 | 58.63 |
| 1988 | 50.0 | 0.0 | 50.0 | 191.65 | 121.55 | 78.03 | 48.71 | 72.35 |
| 1988 | 0.0 | 50.0 | 0.0 | 62.21 | 49.15 | 39.94 | 33.36 | 77.16 |
| 1988 | 50.0 | 50.0 | 50.0 | 213.33 | 134.98 | 86.73 | 54.25 | 64.41 |
| 1988 | 20.6 | 27.3 | 20.6 | 115.59 | 78.98 | 55.60 | 39.62 | 75.52 |
| 1990 | 0.0 | 0.0 | 0.0 | 67.26 | 48.44 | 35.81 | 27.20 | 58.67 |
| 1990 | 0.0 | 100.0 | 0.0 | 51.48 | 42.35 | 35.49 | 30.33 | 51.01 |
| 1990 | 100.0 | 0.0 | 100.0 | 330.10 | 200.10 | 119.81 | 64.08 | 47.44 |
| 1990 | 50.0 | 0.0 | 50.0 | 170.91 | 108.02 | 68.60 | 41.36 | 52.67 |
| 1990 | 0.0 | 50.0 | 0.0 | 59.15 | 44.75 | 34.79 | 27.82 | 54.18 |
| 1990 | 50.0 | 50.0 | 50.0 | 190.79 | 121.23 | 77.65 | 47.21 | 49.22 |
| 1990 | 20.6 | 27.3 | 20.6 | 105.23 | 70.79 | 48.65 | 33.31 | 53.74 |
| 1995 | 0.0 | 0.0 | 0.0 | 61.01 | 40.60 | 27.51 | 19.05 | 32.91 |
| 1995 | 0.0 | 100.0 | 0.0 | 49.39 | 38.24 | 29.89 | 23.63 | 33.65 |
| 1995 | 100.0 | 0.0 | 100.0 | 260.00 | 160.94 | 97.84 | 50.65 | 37.97 |
| 1995 | 50.0 | 0.0 | 50.0 | 138.54 | 87.41 | 54.78 | 31.16 | 34.05 |
| 1995 | 0.0 | 50.0 | 0.0 | 54.68 | 38.56 | 27.74 | 20.40 | 32.35 |
| 1995 | 50.0 | 50.0 | 50.0 | 154.70 | 99.59 | 63.86 | 37.14 | 35.81 |
| 1995 | 20.6 | 27.3 | 20.6 | 89.26 | 58.62 | 38.77 | 24.72 | 33.05 |
| 2000 | 0.0 | 0.0 | 0.0 | 57.39 | 37.15 | 24.36 | 16.26 | 23.39 |
| 2000 | 0.0 | 100.0 | 0.0 | 47.30 | 35.88 | 27.36 | 20.99 | 27.15 |
| 2000 | 100.0 | 0.0 | 100.0 | 232.32 | 145.30 | 88.86 | 45.12 | 34.09 |
| 2000 | 50.0 | 0.0 | 50.0 | 125.33 | 79.13 | 49.36 | 27.33 | 27.04 |
| 2000 | 0.0 | 50.0 | 0.0 | 51.76 | 35.62 | 24.91 | 17.73 | 24.28 |
| 2000 | 50.0 | 50.0 | 50.0 | 139.81 | 90.59 | 58.11 | 33.05 | 30.62 |
| 2000 | 20.6 | 27.3 | 20.6 | 82.09 | 53.47 | 34.87 | 21.58 | 25.35 |

TABLE 27 : CO AT 19.6 MPH.

## TABLE 28

## HIGH ALTITUDE

## CO EMISSION FACTORS (GRAMS/MILE) AT 35.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types @ Ambient Temperature | | | | |
|---|---|---|---|---|---|---|---|---|
| | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 65.35 | 58.62 | 53.08 | 48.52 | 94.86 |
| 1980 | 0.0 | 100.0 | 0.0 | 43.18 | 43.44 | 43.98 | 44.79 | 82.99 |
| 1980 | 100.0 | 0.0 | 100.0 | 401.04 | 237.70 | 142.87 | 87.28 | 60.81 |
| 1980 | 50.0 | 0.0 | 50.0 | 205.55 | 133.27 | 90.27 | 64.24 | 79.16 |
| 1980 | 0.0 | 50.0 | 0.0 | 55.02 | 51.35 | 48.47 | 46.27 | 88.62 |
| 1980 | 50.0 | 50.0 | 50.0 | 222.11 | 140.57 | 93.42 | 66.03 | 71.90 |
| 1980 | 20.6 | 27.3 | 20.6 | 117.16 | 85.24 | 65.80 | 53.72 | 85.01 |
| 1985 | 0.0 | 0.0 | 0.0 | 48.72 | 40.05 | 33.64 | 28.81 | 64.11 |
| 1985 | 0.0 | 100.0 | 0.0 | 33.87 | 31.23 | 29.33 | 28.02 | 52.86 |
| 1985 | 100.0 | 0.0 | 100.0 | 273.14 | 163.07 | 97.48 | 56.24 | 41.71 |
| 1985 | 50.0 | 0.0 | 50.0 | 139.76 | 89.74 | 59.19 | 39.55 | 53.64 |
| 1985 | 0.0 | 50.0 | 0.0 | 41.58 | 35.59 | 31.20 | 27.94 | 58.31 |
| 1985 | 50.0 | 50.0 | 50.0 | 153.50 | 97.15 | 63.40 | 42.13 | 47.28 |
| 1985 | 20.6 | 27.3 | 20.6 | 82.10 | 57.96 | 42.76 | 32.72 | 56.64 |
| 1988 | 0.0 | 0.0 | 0.0 | 41.35 | 31.49 | 24.64 | 19.80 | 50.13 |
| 1988 | 0.0 | 100.0 | 0.0 | 30.23 | 26.03 | 22.90 | 20.58 | 41.53 |
| 1988 | 100.0 | 0.0 | 100.0 | 216.90 | 130.43 | 77.80 | 42.74 | 34.23 |
| 1988 | 50.0 | 0.0 | 50.0 | 111.46 | 70.82 | 45.61 | 28.67 | 42.54 |
| 1988 | 0.0 | 50.0 | 0.0 | 35.82 | 28.52 | 23.36 | 19.68 | 45.59 |
| 1988 | 50.0 | 50.0 | 50.0 | 123.56 | 78.23 | 50.35 | 31.66 | 37.88 |
| 1988 | 20.6 | 27.3 | 20.6 | 67.02 | 45.96 | 32.52 | 23.36 | 44.53 |
| 1990 | 0.0 | 0.0 | 0.0 | 38.31 | 27.76 | 20.66 | 15.81 | 33.85 |
| 1990 | 0.0 | 100.0 | 0.0 | 29.05 | 24.00 | 20.21 | 17.38 | 29.37 |
| 1990 | 100.0 | 0.0 | 100.0 | 188.39 | 114.19 | 68.38 | 36.69 | 27.04 |
| 1990 | 50.0 | 0.0 | 50.0 | 97.66 | 61.80 | 39.33 | 23.84 | 30.25 |
| 1990 | 0.0 | 50.0 | 0.0 | 33.58 | 25.53 | 19.97 | 16.07 | 31.24 |
| 1990 | 50.0 | 50.0 | 50.0 | 108.72 | 69.09 | 44.29 | 27.03 | 28.20 |
| 1990 | 20.6 | 27.3 | 20.6 | 60.01 | 40.46 | 27.91 | 19.23 | 30.94 |
| 1995 | 0.0 | 0.0 | 0.0 | 34.13 | 22.74 | 15.44 | 10.71 | 18.50 |
| 1995 | 0.0 | 100.0 | 0.0 | 27.57 | 21.36 | 16.71 | 13.23 | 18.89 |
| 1995 | 100.0 | 0.0 | 100.0 | 145.50 | 90.05 | 54.73 | 28.35 | 21.23 |
| 1995 | 50.0 | 0.0 | 50.0 | 77.55 | 48.93 | 30.68 | 17.47 | 19.10 |
| 1995 | 0.0 | 50.0 | 0.0 | 30.56 | 21.57 | 15.54 | 11.45 | 18.18 |
| 1995 | 50.0 | 50.0 | 50.0 | 86.53 | 55.70 | 35.72 | 20.79 | 20.06 |
| 1995 | 20.6 | 27.3 | 20.6 | 49.94 | 32.81 | 21.72 | 13.87 | 18.56 |
| 2000 | 0.0 | 0.0 | 0.0 | 31.99 | 20.71 | 13.59 | 9.07 | 13.06 |
| 2000 | 0.0 | 100.0 | 0.0 | 26.35 | 19.99 | 15.25 | 11.71 | 15.16 |
| 2000 | 100.0 | 0.0 | 100.0 | 129.56 | 81.03 | 49.55 | 25.16 | 19.01 |
| 2000 | 50.0 | 0.0 | 50.0 | 69.89 | 44.13 | 27.53 | 15.24 | 15.09 |
| 2000 | 0.0 | 50.0 | 0.0 | 28.84 | 19.86 | 13.89 | 9.89 | 13.56 |
| 2000 | 50.0 | 50.0 | 50.0 | 77.96 | 50.51 | 32.40 | 18.44 | 17.08 |
| 2000 | 20.6 | 27.3 | 20.6 | 45.76 | 29.81 | 19.45 | 12.04 | 14.15 |

TABLE 28 : CO AT 35.0 MPH.

# TABLE 29

# HIGH ALTITUDE

# CO EMISSION FACTORS (GRAMS/MILE) AT 50.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | Combined for Eight Vehicle Types ------- @ Ambient Temperature ------- 0 F | 25 F | 50 F | 75 F | 100 F |
|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 58.63 | 52.71 | 47.84 | 43.81 | 84.84 |
| 1980 | 0.0 | 100.0 | 0.0 | 38.89 | 39.14 | 39.64 | 40.38 | 74.67 |
| 1980 | 100.0 | 0.0 | 100.0 | 357.07 | 212.12 | 127.80 | 78.28 | 54.74 |
| 1980 | 50.0 | 0.0 | 50.0 | 183.51 | 119.29 | 81.02 | 57.82 | 70.96 |
| 1980 | 0.0 | 50.0 | 0.0 | 49.44 | 46.22 | 43.70 | 41.77 | 79.48 |
| 1980 | 50.0 | 50.0 | 50.0 | 197.98 | 125.63 | 83.72 | 59.33 | 64.71 |
| 1980 | 20.6 | 27.3 | 20.6 | 104.79 | 76.45 | 59.17 | 48.43 | 76.21 |
| 1985 | 0.0 | 0.0 | 0.0 | 43.08 | 35.55 | 29.96 | 25.75 | 56.77 |
| 1985 | 0.0 | 100.0 | 0.0 | 29.98 | 27.70 | 26.06 | 24.95 | 47.00 |
| 1985 | 100.0 | 0.0 | 100.0 | 239.39 | 143.14 | 85.75 | 49.68 | 37.11 |
| 1985 | 50.0 | 0.0 | 50.0 | 122.84 | 79.07 | 52.33 | 35.13 | 47.58 |
| 1985 | 0.0 | 50.0 | 0.0 | 36.79 | 31.59 | 27.77 | 24.94 | 51.74 |
| 1985 | 50.0 | 50.0 | 50.0 | 134.69 | 85.42 | 55.91 | 37.31 | 42.06 |
| 1985 | 20.6 | 27.3 | 20.6 | 72.30 | 51.21 | 37.92 | 29.14 | 50.25 |
| 1988 | 0.0 | 0.0 | 0.0 | 36.21 | 27.68 | 21.75 | 17.55 | 44.20 |
| 1988 | 0.0 | 100.0 | 0.0 | 26.47 | 22.84 | 20.14 | 18.14 | 36.72 |
| 1988 | 100.0 | 0.0 | 100.0 | 188.67 | 113.56 | 67.84 | 37.41 | 30.25 |
| 1988 | 50.0 | 0.0 | 50.0 | 97.17 | 61.86 | 39.95 | 25.24 | 37.54 |
| 1988 | 0.0 | 50.0 | 0.0 | 31.37 | 25.06 | 20.60 | 17.41 | 40.26 |
| 1988 | 50.0 | 50.0 | 50.0 | 107.57 | 68.20 | 43.99 | 27.78 | 33.49 |
| 1988 | 20.6 | 27.3 | 20.6 | 58.52 | 40.24 | 28.56 | 20.61 | 39.31 |
| 1990 | 0.0 | 0.0 | 0.0 | 33.35 | 24.24 | 18.11 | 13.91 | 29.62 |
| 1990 | 0.0 | 100.0 | 0.0 | 25.28 | 20.92 | 17.66 | 15.21 | 25.72 |
| 1990 | 100.0 | 0.0 | 100.0 | 163.01 | 98.88 | 59.28 | 31.90 | 23.64 |
| 1990 | 50.0 | 0.0 | 50.0 | 84.65 | 53.65 | 34.22 | 20.83 | 26.47 |
| 1990 | 0.0 | 50.0 | 0.0 | 29.23 | 22.29 | 17.48 | 14.11 | 27.36 |
| 1990 | 50.0 | 50.0 | 50.0 | 94.15 | 59.90 | 38.47 | 23.56 | 24.68 |
| 1990 | 20.6 | 27.3 | 20.6 | 52.09 | 35.20 | 24.35 | 16.84 | 27.09 |
| 1995 | 0.0 | 0.0 | 0.0 | 29.50 | 19.70 | 13.40 | 9.33 | 16.08 |
| 1995 | 0.0 | 100.0 | 0.0 | 23.85 | 18.50 | 14.49 | 11.48 | 16.40 |
| 1995 | 100.0 | 0.0 | 100.0 | 125.25 | 77.55 | 47.17 | 24.49 | 18.40 |
| 1995 | 50.0 | 0.0 | 50.0 | 66.83 | 42.21 | 26.51 | 15.14 | 16.58 |
| 1995 | 0.0 | 50.0 | 0.0 | 26.43 | 18.69 | 13.49 | 9.96 | 15.80 |
| 1995 | 50.0 | 50.0 | 50.0 | 74.55 | 48.02 | 30.83 | 17.98 | 17.40 |
| 1995 | 20.6 | 27.3 | 20.6 | 43.09 | 28.35 | 18.80 | 12.04 | 16.12 |
| 2000 | 0.0 | 0.0 | 0.0 | 27.60 | 17.90 | 11.77 | 7.88 | 11.33 |
| 2000 | 0.0 | 100.0 | 0.0 | 22.76 | 17.28 | 13.19 | 10.14 | 13.12 |
| 2000 | 100.0 | 0.0 | 100.0 | 111.39 | 69.70 | 42.65 | 21.69 | 16.43 |
| 2000 | 50.0 | 0.0 | 50.0 | 60.15 | 38.01 | 23.74 | 13.18 | 13.06 |
| 2000 | 0.0 | 50.0 | 0.0 | 24.90 | 17.16 | 12.02 | 8.58 | 11.75 |
| 2000 | 50.0 | 50.0 | 50.0 | 67.08 | 43.49 | 27.92 | 15.92 | 14.78 |
| 2000 | 20.6 | 27.3 | 20.6 | 39.43 | 25.71 | 16.80 | 10.42 | 12.26 |

TABLE 29 : CO AT 50.0 MPH.

## TABLE 30

## HIGH ALTITUDE

## CO EMISSION FACTORS (GRAMS/MILE) AT 55.0 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types @ Ambient Temperature | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 56.84 | 51.24 | 46.63 | 42.81 | 81.77 |
| 1980 | 0.0 | 100.0 | 0.0 | 38.15 | 38.34 | 38.77 | 39.46 | 72.59 |
| 1980 | 100.0 | 0.0 | 100.0 | 338.82 | 202.10 | 122.37 | 75.41 | 53.56 |
| 1980 | 50.0 | 0.0 | 50.0 | 175.06 | 114.38 | 78.12 | 56.09 | 68.76 |
| 1980 | 0.0 | 50.0 | 0.0 | 48.14 | 45.07 | 42.67 | 40.83 | 76.90 |
| 1980 | 50.0 | 50.0 | 50.0 | 188.49 | 120.22 | 80.57 | 57.43 | 63.07 |
| 1980 | 20.6 | 27.3 | 20.6 | 100.54 | 73.75 | 57.37 | 47.16 | 73.77 |
| 1985 | 0.0 | 0.0 | 0.0 | 41.11 | 34.13 | 28.93 | 24.99 | 54.26 |
| 1985 | 0.0 | 100.0 | 0.0 | 28.86 | 26.72 | 25.19 | 24.14 | 45.30 |
| 1985 | 100.0 | 0.0 | 100.0 | 223.15 | 133.89 | 80.61 | 47.13 | 35.98 |
| 1985 | 50.0 | 0.0 | 50.0 | 115.20 | 74.55 | 49.69 | 33.69 | 45.72 |
| 1985 | 0.0 | 50.0 | 0.0 | 35.23 | 30.41 | 26.85 | 24.20 | 49.64 |
| 1985 | 50.0 | 50.0 | 50.0 | 126.00 | 80.31 | 52.90 | 35.63 | 40.64 |
| 1985 | 20.6 | 27.3 | 20.6 | 68.24 | 48.65 | 36.29 | 28.11 | 48.23 |
| 1988 | 0.0 | 0.0 | 0.0 | 34.05 | 26.22 | 20.75 | 16.85 | 41.97 |
| 1988 | 0.0 | 100.0 | 0.0 | 25.03 | 21.68 | 19.18 | 17.33 | 35.11 |
| 1988 | 100.0 | 0.0 | 100.0 | 174.16 | 105.09 | 63.03 | 35.06 | 29.02 |
| 1988 | 50.0 | 0.0 | 50.0 | 90.15 | 57.65 | 37.46 | 26.72 | 35.79 |
| 1988 | 0.0 | 50.0 | 0.0 | 29.58 | 23.77 | 19.65 | 18.85 | 38.35 |
| 1988 | 50.0 | 50.0 | 50.0 | 99.60 | 63.39 | 41.10 | 28.88 | 32.06 |
| 1988 | 20.6 | 27.3 | 20.6 | 54.57 | 37.74 | 26.98 | 22.08 | 37.46 |
| 1990 | 0.0 | 0.0 | 0.0 | 31.10 | 22.76 | 17.12 | 13.25 | 27.87 |
| 1990 | 0.0 | 100.0 | 0.0 | 23.67 | 19.66 | 16.65 | 14.40 | 24.29 |
| 1990 | 100.0 | 0.0 | 100.0 | 149.58 | 90.92 | 54.69 | 29.66 | 22.33 |
| 1990 | 50.0 | 0.0 | 50.0 | 78.02 | 49.64 | 31.84 | 19.56 | 24.96 |
| 1990 | 0.0 | 50.0 | 0.0 | 27.31 | 20.95 | 16.53 | 13.42 | 25.80 |
| 1990 | 50.0 | 50.0 | 50.0 | 86.63 | 55.29 | 35.67 | 22.03 | 23.31 |
| 1990 | 20.6 | 27.3 | 20.6 | 48.23 | 32.76 | 22.81 | 15.92 | 25.54 |
| 1995 | 0.0 | 0.0 | 0.0 | 27.22 | 18.28 | 12.52 | 8.79 | 15.04 |
| 1995 | 0.0 | 100.0 | 0.0 | 22.08 | 17.18 | 13.50 | 10.74 | 15.33 |
| 1995 | 100.0 | 0.0 | 100.0 | 114.19 | 70.82 | 43.19 | 22.56 | 17.13 |
| 1995 | 50.0 | 0.0 | 50.0 | 61.14 | 38.73 | 24.42 | 14.07 | 15.48 |
| 1995 | 0.0 | 50.0 | 0.0 | 24.43 | 17.36 | 12.60 | 9.36 | 14.78 |
| 1995 | 50.0 | 50.0 | 50.0 | 68.13 | 44.00 | 28.35 | 16.65 | 16.23 |
| 1995 | 20.6 | 27.3 | 20.6 | 39.56 | 26.13 | 17.43 | 11.25 | 15.07 |
| 2000 | 0.0 | 0.0 | 0.0 | 25.39 | 16.55 | 10.96 | 7.40 | 10.58 |
| 2000 | 0.0 | 100.0 | 0.0 | 21.00 | 16.00 | 12.26 | 9.46 | 12.22 |
| 2000 | 100.0 | 0.0 | 100.0 | 101.43 | 63.56 | 38.99 | 19.95 | 15.22 |
| 2000 | 50.0 | 0.0 | 50.0 | 54.93 | 34.80 | 21.82 | 12.21 | 12.16 |
| 2000 | 0.0 | 50.0 | 0.0 | 22.94 | 15.89 | 11.19 | 8.04 | 10.97 |
| 2000 | 50.0 | 50.0 | 50.0 | 61.22 | 39.78 | 25.62 | 14.70 | 13.72 |
| 2000 | 20.6 | 27.3 | 20.6 | 36.13 | 23.65 | 15.52 | 9.71 | 11.43 |

TABLE 30 : CO AT 55.0 MPH.

## TABLE 31

## HIGH ALTITUDE

## NOx EMISSION FACTORS (GRAMS/MILE) AT 5.0 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types @ Ambient Temperature | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 4.95 | 4.64 | 4.37 | 4.14 | 3.71 |
| 1980 | 0.0 | 100.0 | 0.0 | 5.54 | 5.20 | 4.90 | 4.64 | 4.00 |
| 1980 | 100.0 | 0.0 | 100.0 | 4.85 | 4.75 | 4.67 | 4.62 | 4.15 |
| 1980 | 50.0 | 0.0 | 50.0 | 4.99 | 4.78 | 4.62 | 4.48 | 4.02 |
| 1980 | 0.0 | 50.0 | 0.0 | 5.39 | 5.05 | 4.75 | 4.50 | 3.93 |
| 1980 | 50.0 | 50.0 | 50.0 | 5.19 | 4.97 | 4.78 | 4.63 | 4.08 |
| 1980 | 20.6 | 27.3 | 20.6 | 5.21 | 4.93 | 4.69 | 4.48 | 3.96 |
| 1985 | 0.0 | 0.0 | 0.0 | 3.84 | 3.59 | 3.37 | 3.18 | 2.73 |
| 1985 | 0.0 | 100.0 | 0.0 | 4.22 | 3.94 | 3.70 | 3.50 | 2.93 |
| 1985 | 100.0 | 0.0 | 100.0 | 4.12 | 3.90 | 3.72 | 3.57 | 2.94 |
| 1985 | 50.0 | 0.0 | 50.0 | 4.06 | 3.82 | 3.61 | 3.44 | 2.88 |
| 1985 | 0.0 | 50.0 | 0.0 | 4.12 | 3.85 | 3.61 | 3.41 | 2.87 |
| 1985 | 50.0 | 50.0 | 50.0 | 4.17 | 3.92 | 3.71 | 3.53 | 2.94 |
| 1985 | 20.6 | 27.3 | 20.6 | 4.09 | 3.82 | 3.60 | 3.41 | 2.87 |
| 1988 | 0.0 | 0.0 | 0.0 | 3.39 | 3.14 | 2.92 | 2.74 | 2.46 |
| 1988 | 0.0 | 100.0 | 0.0 | 3.71 | 3.42 | 3.17 | 2.97 | 2.63 |
| 1988 | 100.0 | 0.0 | 100.0 | 3.73 | 3.47 | 3.25 | 3.07 | 2.63 |
| 1988 | 50.0 | 0.0 | 50.0 | 3.63 | 3.37 | 3.15 | 2.96 | 2.58 |
| 1988 | 0.0 | 50.0 | 0.0 | 3.63 | 3.34 | 3.10 | 2.90 | 2.58 |
| 1988 | 50.0 | 50.0 | 50.0 | 3.72 | 3.45 | 3.21 | 3.02 | 2.63 |
| 1988 | 20.6 | 27.3 | 20.6 | 3.62 | 3.35 | 3.12 | 2.92 | 2.58 |
| 1990 | 0.0 | 0.0 | 0.0 | 3.12 | 2.87 | 2.65 | 2.47 | 1.92 |
| 1990 | 0.0 | 100.0 | 0.0 | 3.43 | 3.12 | 2.86 | 2.64 | 2.05 |
| 1990 | 100.0 | 0.0 | 100.0 | 3.44 | 3.18 | 2.96 | 2.77 | 2.05 |
| 1990 | 50.0 | 0.0 | 50.0 | 3.35 | 3.08 | 2.86 | 2.67 | 2.01 |
| 1990 | 0.0 | 50.0 | 0.0 | 3.34 | 3.05 | 2.80 | 2.60 | 2.01 |
| 1990 | 50.0 | 50.0 | 50.0 | 3.43 | 3.15 | 2.91 | 2.70 | 2.05 |
| 1990 | 20.6 | 27.3 | 20.6 | 3.34 | 3.06 | 2.82 | 2.62 | 2.01 |
| 1995 | 0.0 | 0.0 | 0.0 | 2.83 | 2.58 | 2.38 | 2.20 | 1.59 |
| 1995 | 0.0 | 100.0 | 0.0 | 3.15 | 2.80 | 2.52 | 2.29 | 1.70 |
| 1995 | 100.0 | 0.0 | 100.0 | 3.07 | 2.83 | 2.62 | 2.43 | 1.70 |
| 1995 | 50.0 | 0.0 | 50.0 | 3.01 | 2.76 | 2.54 | 2.36 | 1.66 |
| 1995 | 0.0 | 50.0 | 0.0 | 3.05 | 2.74 | 2.49 | 2.27 | 1.66 |
| 1995 | 50.0 | 50.0 | 50.0 | 3.11 | 2.82 | 2.57 | 2.36 | 1.70 |
| 1995 | 20.6 | 27.3 | 20.6 | 3.03 | 2.74 | 2.51 | 2.31 | 1.66 |
| 2000 | 0.0 | 0.0 | 0.0 | 2.71 | 2.48 | 2.28 | 2.10 | 1.49 |
| 2000 | 0.0 | 100.0 | 0.0 | 3.04 | 2.69 | 2.40 | 2.16 | 1.59 |
| 2000 | 100.0 | 0.0 | 100.0 | 2.92 | 2.69 | 2.49 | 2.32 | 1.60 |
| 2000 | 50.0 | 0.0 | 50.0 | 2.87 | 2.63 | 2.43 | 2.25 | 1.56 |
| 2000 | 0.0 | 50.0 | 0.0 | 2.94 | 2.63 | 2.37 | 2.16 | 1.55 |
| 2000 | 50.0 | 50.0 | 50.0 | 2.98 | 2.69 | 2.45 | 2.24 | 1.59 |
| 2000 | 20.6 | 27.3 | 20.6 | 2.90 | 2.63 | 2.39 | 2.20 | 1.55 |

TABLE 31 : NOx AT 5.0 MPH.

## TABLE 32

## HIGH ALTITUDE

## NOx EMISSION FACTORS (GRAMS/MILE) AT 10.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types @ Ambient Temperature | | | | |
|---|---|---|---|---|---|---|---|---|
| | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 4.24 | 3.97 | 3.74 | 3.54 | 3.15 |
| 1980 | 0.0 | 100.0 | 0.0 | 4.74 | 4.45 | 4.19 | 3.98 | 3.41 |
| 1980 | 100.0 | 0.0 | 100.0 | 4.21 | 4.11 | 4.02 | 3.96 | 3.52 |
| 1980 | 50.0 | 0.0 | 50.0 | 4.30 | 4.12 | 3.97 | 3.84 | 3.41 |
| 1980 | 0.0 | 50.0 | 0.0 | 4.61 | 4.32 | 4.07 | 3.85 | 3.34 |
| 1980 | 50.0 | 50.0 | 50.0 | 4.48 | 4.28 | 4.11 | 3.97 | 3.46 |
| 1980 | 20.6 | 27.3 | 20.6 | 4.47 | 4.23 | 4.02 | 3.84 | 3.36 |
| 1985 | 0.0 | 0.0 | 0.0 | 3.44 | 3.20 | 2.99 | 2.82 | 2.38 |
| 1985 | 0.0 | 100.0 | 0.0 | 3.79 | 3.53 | 3.30 | 3.11 | 2.56 |
| 1985 | 100.0 | 0.0 | 100.0 | 3.74 | 3.52 | 3.33 | 3.18 | 2.57 |
| 1985 | 50.0 | 0.0 | 50.0 | 3.67 | 3.43 | 3.23 | 3.06 | 2.51 |
| 1985 | 0.0 | 50.0 | 0.0 | 3.70 | 3.44 | 3.21 | 3.02 | 2.50 |
| 1985 | 50.0 | 50.0 | 50.0 | 3.77 | 3.52 | 3.32 | 3.14 | 2.56 |
| 1985 | 20.6 | 27.3 | 20.6 | 3.68 | 3.43 | 3.21 | 3.03 | 2.50 |
| 1988 | 0.0 | 0.0 | 0.0 | 3.11 | 2.86 | 2.65 | 2.47 | 2.16 |
| 1988 | 0.0 | 100.0 | 0.0 | 3.42 | 3.13 | 2.89 | 2.68 | 2.31 |
| 1988 | 100.0 | 0.0 | 100.0 | 3.46 | 3.20 | 2.98 | 2.79 | 2.31 |
| 1988 | 50.0 | 0.0 | 50.0 | 3.36 | 3.09 | 2.87 | 2.68 | 2.26 |
| 1988 | 0.0 | 50.0 | 0.0 | 3.34 | 3.06 | 2.82 | 2.62 | 2.27 |
| 1988 | 50.0 | 50.0 | 50.0 | 3.44 | 3.16 | 2.93 | 2.74 | 2.31 |
| 1988 | 20.6 | 27.3 | 20.6 | 3.34 | 3.07 | 2.84 | 2.64 | 2.26 |
| 1990 | 0.0 | 0.0 | 0.0 | 2.90 | 2.65 | 2.43 | 2.25 | 1.70 |
| 1990 | 0.0 | 100.0 | 0.0 | 3.20 | 2.89 | 2.63 | 2.42 | 1.83 |
| 1990 | 100.0 | 0.0 | 100.0 | 3.22 | 2.96 | 2.73 | 2.54 | 1.82 |
| 1990 | 50.0 | 0.0 | 50.0 | 3.12 | 2.86 | 2.64 | 2.45 | 1.78 |
| 1990 | 0.0 | 50.0 | 0.0 | 3.12 | 2.82 | 2.58 | 2.37 | 1.79 |
| 1990 | 50.0 | 50.0 | 50.0 | 3.21 | 2.92 | 2.68 | 2.48 | 1.82 |
| 1990 | 20.6 | 27.3 | 20.6 | 3.11 | 2.83 | 2.60 | 2.40 | 1.78 |
| 1995 | 0.0 | 0.0 | 0.0 | 2.66 | 2.41 | 2.20 | 2.02 | 1.41 |
| 1995 | 0.0 | 100.0 | 0.0 | 2.97 | 2.63 | 2.34 | 2.11 | 1.52 |
| 1995 | 100.0 | 0.0 | 100.0 | 2.90 | 2.66 | 2.44 | 2.26 | 1.52 |
| 1995 | 50.0 | 0.0 | 50.0 | 2.84 | 2.59 | 2.37 | 2.18 | 1.48 |
| 1995 | 0.0 | 50.0 | 0.0 | 2.88 | 2.57 | 2.31 | 2.10 | 1.49 |
| 1995 | 50.0 | 50.0 | 50.0 | 2.94 | 2.64 | 2.39 | 2.18 | 1.52 |
| 1995 | 20.6 | 27.3 | 20.6 | 2.86 | 2.57 | 2.33 | 2.13 | 1.48 |
| 2000 | 0.0 | 0.0 | 0.0 | 2.55 | 2.32 | 2.11 | 1.94 | 1.32 |
| 2000 | 0.0 | 100.0 | 0.0 | 2.88 | 2.53 | 2.24 | 2.00 | 1.42 |
| 2000 | 100.0 | 0.0 | 100.0 | 2.75 | 2.53 | 2.33 | 2.15 | 1.43 |
| 2000 | 50.0 | 0.0 | 50.0 | 2.71 | 2.47 | 2.26 | 2.09 | 1.39 |
| 2000 | 0.0 | 50.0 | 0.0 | 2.78 | 2.47 | 2.21 | 2.00 | 1.38 |
| 2000 | 50.0 | 50.0 | 50.0 | 2.82 | 2.53 | 2.28 | 2.08 | 1.42 |
| 2000 | 20.6 | 27.3 | 20.6 | 2.74 | 2.47 | 2.23 | 2.03 | 1.38 |

TABLE 32 : NOx AT 10.0 MPH.

## TABLE 33

## HIGH ALTITUDE

## NOx EMISSION FACTORS (GRAMS/MILE) AT 19.6 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types @ Ambient Temperature | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 4.05 | 3.76 | 3.51 | 3.29 | 2.84 |
| 1980 | 0.0 | 100.0 | 0.0 | 4.61 | 4.29 | 4.01 | 3.77 | 3.13 |
| 1980 | 100.0 | 0.0 | 100.0 | 4.08 | 3.95 | 3.84 | 3.77 | 3.25 |
| 1980 | 50.0 | 0.0 | 50.0 | 4.15 | 3.94 | 3.77 | 3.63 | 3.13 |
| 1980 | 0.0 | 50.0 | 0.0 | 4.47 | 4.15 | 3.87 | 3.63 | 3.06 |
| 1980 | 50.0 | 50.0 | 50.0 | 4.34 | 4.12 | 3.93 | 3.77 | 3.19 |
| 1980 | 20.6 | 27.3 | 20.6 | 4.32 | 4.05 | 3.82 | 3.62 | 3.08 |
| 1985 | 0.0 | 0.0 | 0.0 | 3.44 | 3.15 | 2.91 | 2.70 | 2.18 |
| 1985 | 0.0 | 100.0 | 0.0 | 3.85 | 3.53 | 3.26 | 3.03 | 2.38 |
| 1985 | 100.0 | 0.0 | 100.0 | 3.82 | 3.54 | 3.31 | 3.13 | 2.39 |
| 1985 | 50.0 | 0.0 | 50.0 | 3.72 | 3.43 | 3.19 | 2.99 | 2.33 |
| 1985 | 0.0 | 50.0 | 0.0 | 3.74 | 3.43 | 3.16 | 2.93 | 2.32 |
| 1985 | 50.0 | 50.0 | 50.0 | 3.83 | 3.54 | 3.29 | 3.08 | 2.39 |
| 1985 | 20.6 | 27.3 | 20.6 | 3.72 | 3.42 | 3.17 | 2.95 | 2.32 |
| 1988 | 0.0 | 0.0 | 0.0 | 3.20 | 2.90 | 2.64 | 2.42 | 1.98 |
| 1988 | 0.0 | 100.0 | 0.0 | 3.56 | 3.22 | 2.92 | 2.67 | 2.16 |
| 1988 | 100.0 | 0.0 | 100.0 | 3.62 | 3.30 | 3.03 | 2.81 | 2.15 |
| 1988 | 50.0 | 0.0 | 50.0 | 3.50 | 3.18 | 2.91 | 2.68 | 2.10 |
| 1988 | 0.0 | 50.0 | 0.0 | 3.47 | 3.13 | 2.85 | 2.61 | 2.11 |
| 1988 | 50.0 | 50.0 | 50.0 | 3.59 | 3.26 | 2.98 | 2.74 | 2.16 |
| 1988 | 20.6 | 27.3 | 20.6 | 3.47 | 3.14 | 2.87 | 2.63 | 2.10 |
| 1990 | 0.0 | 0.0 | 0.0 | 3.03 | 2.73 | 2.47 | 2.25 | 1.59 |
| 1990 | 0.0 | 100.0 | 0.0 | 3.39 | 3.02 | 2.70 | 2.44 | 1.74 |
| 1990 | 100.0 | 0.0 | 100.0 | 3.42 | 3.10 | 2.83 | 2.59 | 1.72 |
| 1990 | 50.0 | 0.0 | 50.0 | 3.31 | 2.99 | 2.71 | 2.48 | 1.68 |
| 1990 | 0.0 | 50.0 | 0.0 | 3.29 | 2.94 | 2.64 | 2.39 | 1.69 |
| 1990 | 50.0 | 50.0 | 50.0 | 3.41 | 3.06 | 2.77 | 2.52 | 1.73 |
| 1990 | 20.6 | 27.3 | 20.6 | 3.29 | 2.95 | 2.67 | 2.43 | 1.69 |
| 1995 | 0.0 | 0.0 | 0.0 | 2.82 | 2.52 | 2.27 | 2.05 | 1.32 |
| 1995 | 0.0 | 100.0 | 0.0 | 3.20 | 2.78 | 2.44 | 2.15 | 1.44 |
| 1995 | 100.0 | 0.0 | 100.0 | 3.11 | 2.81 | 2.55 | 2.33 | 1.44 |
| 1995 | 50.0 | 0.0 | 50.0 | 3.04 | 2.73 | 2.47 | 2.24 | 1.40 |
| 1995 | 0.0 | 50.0 | 0.0 | 3.09 | 2.72 | 2.40 | 2.14 | 1.40 |
| 1995 | 50.0 | 50.0 | 50.0 | 3.16 | 2.80 | 2.50 | 2.24 | 1.44 |
| 1995 | 20.6 | 27.3 | 20.6 | 3.06 | 2.72 | 2.43 | 2.18 | 1.40 |
| 2000 | 0.0 | 0.0 | 0.0 | 2.71 | 2.43 | 2.18 | 1.97 | 1.22 |
| 2000 | 0.0 | 100.0 | 0.0 | 3.11 | 2.68 | 2.33 | 2.04 | 1.34 |
| 2000 | 100.0 | 0.0 | 100.0 | 2.95 | 2.67 | 2.43 | 2.22 | 1.34 |
| 2000 | 50.0 | 0.0 | 50.0 | 2.90 | 2.61 | 2.36 | 2.14 | 1.30 |
| 2000 | 0.0 | 50.0 | 0.0 | 2.99 | 2.61 | 2.30 | 2.04 | 1.30 |
| 2000 | 50.0 | 50.0 | 50.0 | 3.03 | 2.68 | 2.38 | 2.13 | 1.34 |
| 2000 | 20.6 | 27.3 | 20.6 | 2.94 | 2.61 | 2.32 | 2.08 | 1.30 |

TABLE 33 : NOx AT 19.6 MPH.

## TABLE 34

## HIGH ALTITUDE

## NOx EMISSION FACTORS (GRAMS/MILE) AT 35.0 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types @ Ambient Temperature | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 4.70 | 4.31 | 3.97 | 3.68 | 3.08 |
| 1980 | 0.0 | 100.0 | 0.0 | 5.45 | 5.02 | 4.65 | 4.32 | 3.47 |
| 1980 | 100.0 | 0.0 | 100.0 | 4.70 | 4.53 | 4.40 | 4.31 | 3.63 |
| 1980 | 50.0 | 0.0 | 50.0 | 4.82 | 4.54 | 4.31 | 4.13 | 3.47 |
| 1980 | 0.0 | 50.0 | 0.0 | 5.26 | 4.83 | 4.46 | 4.14 | 3.37 |
| 1980 | 50.0 | 50.0 | 50.0 | 5.07 | 4.78 | 4.53 | 4.32 | 3.55 |
| 1980 | 20.6 | 27.3 | 20.6 | 5.06 | 4.69 | 4.38 | 4.12 | 3.40 |
| 1985 | 0.0 | 0.0 | 0.0 | 3.97 | 3.60 | 3.28 | 3.00 | 2.32 |
| 1985 | 0.0 | 100.0 | 0.0 | 4.51 | 4.10 | 3.75 | 3.45 | 2.60 |
| 1985 | 100.0 | 0.0 | 100.0 | 4.44 | 4.09 | 3.80 | 3.56 | 2.61 |
| 1985 | 50.0 | 0.0 | 50.0 | 4.33 | 3.95 | 3.64 | 3.38 | 2.53 |
| 1985 | 0.0 | 50.0 | 0.0 | 4.37 | 3.96 | 3.61 | 3.31 | 2.52 |
| 1985 | 50.0 | 50.0 | 50.0 | 4.48 | 4.10 | 3.77 | 3.50 | 2.60 |
| 1985 | 20.6 | 27.3 | 20.6 | 4.34 | 3.95 | 3.61 | 3.33 | 2.52 |
| 1988 | 0.0 | 0.0 | 0.0 | 3.72 | 3.33 | 3.00 | 2.72 | 2.11 |
| 1988 | 0.0 | 100.0 | 0.0 | 4.20 | 3.75 | 3.37 | 3.05 | 2.35 |
| 1988 | 100.0 | 0.0 | 100.0 | 4.26 | 3.85 | 3.51 | 3.22 | 2.33 |
| 1988 | 50.0 | 0.0 | 50.0 | 4.11 | 3.69 | 3.35 | 3.05 | 2.27 |
| 1988 | 0.0 | 50.0 | 0.0 | 4.07 | 3.64 | 3.27 | 2.96 | 2.28 |
| 1988 | 50.0 | 50.0 | 50.0 | 4.23 | 3.80 | 3.44 | 3.13 | 2.34 |
| 1988 | 20.6 | 27.3 | 20.6 | 4.08 | 3.65 | 3.29 | 2.99 | 2.27 |
| 1990 | 0.0 | 0.0 | 0.0 | 3.55 | 3.16 | 2.83 | 2.54 | 1.70 |
| 1990 | 0.0 | 100.0 | 0.0 | 4.03 | 3.54 | 3.14 | 2.80 | 1.89 |
| 1990 | 100.0 | 0.0 | 100.0 | 4.05 | 3.64 | 3.29 | 2.99 | 1.87 |
| 1990 | 50.0 | 0.0 | 50.0 | 3.91 | 3.50 | 3.14 | 2.85 | 1.82 |
| 1990 | 0.0 | 50.0 | 0.0 | 3.90 | 3.44 | 3.06 | 2.74 | 1.84 |
| 1990 | 50.0 | 50.0 | 50.0 | 4.04 | 3.59 | 3.21 | 2.89 | 1.88 |
| 1990 | 20.6 | 27.3 | 20.6 | 3.89 | 3.46 | 3.09 | 2.78 | 1.83 |
| 1995 | 0.0 | 0.0 | 0.0 | 3.33 | 2.94 | 2.61 | 2.34 | 1.40 |
| 1995 | 0.0 | 100.0 | 0.0 | 3.82 | 3.28 | 2.83 | 2.47 | 1.56 |
| 1995 | 100.0 | 0.0 | 100.0 | 3.70 | 3.31 | 2.98 | 2.69 | 1.55 |
| 1995 | 50.0 | 0.0 | 50.0 | 3.61 | 3.21 | 2.87 | 2.58 | 1.50 |
| 1995 | 0.0 | 50.0 | 0.0 | 3.68 | 3.19 | 2.79 | 2.45 | 1.51 |
| 1995 | 50.0 | 50.0 | 50.0 | 3.76 | 3.29 | 2.90 | 2.58 | 1.55 |
| 1995 | 20.6 | 27.3 | 20.6 | 3.64 | 3.19 | 2.82 | 2.50 | 1.50 |
| 2000 | 0.0 | 0.0 | 0.0 | 3.20 | 2.83 | 2.51 | 2.24 | 1.29 |
| 2000 | 0.0 | 100.0 | 0.0 | 3.72 | 3.16 | 2.70 | 2.33 | 1.44 |
| 2000 | 100.0 | 0.0 | 100.0 | 3.50 | 3.14 | 2.83 | 2.56 | 1.44 |
| 2000 | 50.0 | 0.0 | 50.0 | 3.44 | 3.06 | 2.74 | 2.46 | 1.39 |
| 2000 | 0.0 | 50.0 | 0.0 | 3.56 | 3.07 | 2.67 | 2.33 | 1.39 |
| 2000 | 50.0 | 50.0 | 50.0 | 3.61 | 3.15 | 2.77 | 2.45 | 1.44 |
| 2000 | 20.6 | 27.3 | 20.6 | 3.50 | 3.06 | 2.69 | 2.38 | 1.39 |

TABLE 34 : NOx AT 35.0 MPH.

## TABLE 35

## HIGH ALTITUDE

## NOx EMISSION FACTORS (GRAMS/MILE) AT 50.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types @ Ambient Temperature | | | | |
|---|---|---|---|---|---|---|---|---|
| | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 5.39 | 4.94 | 4.56 | 4.24 | 3.57 |
| 1980 | 0.0 | 100.0 | 0.0 | 6.23 | 5.75 | 5.33 | 4.96 | 4.01 |
| 1980 | 100.0 | 0.0 | 100.0 | 5.38 | 5.19 | 5.05 | 4.95 | 4.19 |
| 1980 | 50.0 | 0.0 | 50.0 | 5.52 | 5.21 | 4.95 | 4.74 | 4.00 |
| 1980 | 0.0 | 50.0 | 0.0 | 6.02 | 5.53 | 5.12 | 4.75 | 3.90 |
| 1980 | 50.0 | 50.0 | 50.0 | 5.81 | 5.47 | 5.19 | 4.96 | 4.10 |
| 1980 | 20.6 | 27.3 | 20.6 | 5.79 | 5.38 | 5.03 | 4.73 | 3.93 |
| 1985 | 0.0 | 0.0 | 0.0 | 4.54 | 4.11 | 3.75 | 3.45 | 2.69 |
| 1985 | 0.0 | 100.0 | 0.0 | 5.14 | 4.68 | 4.29 | 3.95 | 3.00 |
| 1985 | 100.0 | 0.0 | 100.0 | 5.06 | 4.67 | 4.34 | 4.08 | 3.01 |
| 1985 | 50.0 | 0.0 | 50.0 | 4.93 | 4.51 | 4.16 | 3.87 | 2.92 |
| 1985 | 0.0 | 50.0 | 0.0 | 4.98 | 4.53 | 4.13 | 3.80 | 2.91 |
| 1985 | 50.0 | 50.0 | 50.0 | 5.10 | 4.67 | 4.31 | 4.01 | 3.00 |
| 1985 | 20.6 | 27.3 | 20.6 | 4.95 | 4.51 | 4.14 | 3.82 | 2.91 |
| 1988 | 0.0 | 0.0 | 0.0 | 4.23 | 3.80 | 3.43 | 3.11 | 2.44 |
| 1988 | 0.0 | 100.0 | 0.0 | 4.77 | 4.27 | 3.84 | 3.48 | 2.71 |
| 1988 | 100.0 | 0.0 | 100.0 | 4.84 | 4.38 | 3.99 | 3.67 | 2.69 |
| 1988 | 50.0 | 0.0 | 50.0 | 4.66 | 4.20 | 3.82 | 3.49 | 2.62 |
| 1988 | 0.0 | 50.0 | 0.0 | 4.63 | 4.14 | 3.73 | 3.38 | 2.63 |
| 1988 | 50.0 | 50.0 | 50.0 | 4.81 | 4.32 | 3.92 | 3.58 | 2.70 |
| 1988 | 20.6 | 27.3 | 20.6 | 4.63 | 4.16 | 3.76 | 3.42 | 2.62 |
| 1990 | 0.0 | 0.0 | 0.0 | 4.03 | 3.60 | 3.22 | 2.91 | 1.96 |
| 1990 | 0.0 | 100.0 | 0.0 | 4.56 | 4.02 | 3.57 | 3.19 | 2.18 |
| 1990 | 100.0 | 0.0 | 100.0 | 4.59 | 4.13 | 3.74 | 3.41 | 2.16 |
| 1990 | 50.0 | 0.0 | 50.0 | 4.43 | 3.97 | 3.58 | 3.24 | 2.10 |
| 1990 | 0.0 | 50.0 | 0.0 | 4.42 | 3.91 | 3.48 | 3.12 | 2.11 |
| 1990 | 50.0 | 50.0 | 50.0 | 4.58 | 4.08 | 3.65 | 3.30 | 2.17 |
| 1990 | 20.6 | 27.3 | 20.6 | 4.41 | 3.93 | 3.51 | 3.16 | 2.10 |
| 1995 | 0.0 | 0.0 | 0.0 | 3.77 | 3.34 | 2.97 | 2.66 | 1.61 |
| 1995 | 0.0 | 100.0 | 0.0 | 4.32 | 3.71 | 3.22 | 2.81 | 1.79 |
| 1995 | 100.0 | 0.0 | 100.0 | 4.18 | 3.75 | 3.38 | 3.06 | 1.78 |
| 1995 | 50.0 | 0.0 | 50.0 | 4.08 | 3.64 | 3.26 | 2.93 | 1.73 |
| 1995 | 0.0 | 50.0 | 0.0 | 4.16 | 3.62 | 3.17 | 2.79 | 1.74 |
| 1995 | 50.0 | 50.0 | 50.0 | 4.25 | 3.73 | 3.30 | 2.93 | 1.79 |
| 1995 | 20.6 | 27.3 | 20.6 | 4.12 | 3.62 | 3.20 | 2.85 | 1.73 |
| 2000 | 0.0 | 0.0 | 0.0 | 3.63 | 3.21 | 2.86 | 2.55 | 1.49 |
| 2000 | 0.0 | 100.0 | 0.0 | 4.20 | 3.58 | 3.07 | 2.65 | 1.66 |
| 2000 | 100.0 | 0.0 | 100.0 | 3.96 | 3.56 | 3.22 | 2.91 | 1.66 |
| 2000 | 50.0 | 0.0 | 50.0 | 3.89 | 3.47 | 3.11 | 2.80 | 1.60 |
| 2000 | 0.0 | 50.0 | 0.0 | 4.03 | 3.48 | 3.03 | 2.65 | 1.60 |
| 2000 | 50.0 | 50.0 | 50.0 | 4.08 | 3.57 | 3.14 | 2.78 | 1.66 |
| 2000 | 20.6 | 27.3 | 20.6 | 3.96 | 3.47 | 3.06 | 2.71 | 1.60 |

TABLE 35 : NOx AT 50.0 MPH.

## TABLE 36

## HIGH ALTITUDE

## NOx EMISSION FACTORS (GRAMS/MILE) AT 55.0 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | Combined for Eight Vehicle Types @ Ambient Temperature | | | | |
|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0 F | 25 F | 50 F | 75 F | 100 F |
| 1980 | 0.0 | 0.0 | 0.0 | 5.91 | 5.43 | 5.02 | 4.66 | 3.95 |
| 1980 | 0.0 | 100.0 | 0.0 | 6.82 | 6.30 | 5.84 | 5.45 | 4.42 |
| 1980 | 100.0 | 0.0 | 100.0 | 5.90 | 5.70 | 5.55 | 5.44 | 4.62 |
| 1980 | 50.0 | 0.0 | 50.0 | 6.05 | 5.71 | 5.44 | 5.21 | 4.42 |
| 1980 | 0.0 | 50.0 | 0.0 | 6.59 | 6.07 | 5.61 | 5.22 | 4.30 |
| 1980 | 50.0 | 50.0 | 50.0 | 6.36 | 6.00 | 5.70 | 5.44 | 4.52 |
| 1980 | 20.6 | 27.3 | 20.6 | 6.34 | 5.90 | 5.52 | 5.20 | 4.34 |
| 1985 | 0.0 | 0.0 | 0.0 | 4.96 | 4.51 | 4.12 | 3.79 | 2.97 |
| 1985 | 0.0 | 100.0 | 0.0 | 5.61 | 5.12 | 4.69 | 4.33 | 3.31 |
| 1985 | 100.0 | 0.0 | 100.0 | 5.53 | 5.11 | 4.76 | 4.47 | 3.32 |
| 1985 | 50.0 | 0.0 | 50.0 | 5.39 | 4.94 | 4.56 | 4.25 | 3.22 |
| 1985 | 0.0 | 50.0 | 0.0 | 5.44 | 4.95 | 4.53 | 4.17 | 3.21 |
| 1985 | 50.0 | 50.0 | 50.0 | 5.57 | 5.11 | 4.72 | 4.40 | 3.31 |
| 1985 | 20.6 | 27.3 | 20.6 | 5.41 | 4.93 | 4.53 | 4.19 | 3.21 |
| 1988 | 0.0 | 0.0 | 0.0 | 4.62 | 4.15 | 3.75 | 3.41 | 2.69 |
| 1988 | 0.0 | 100.0 | 0.0 | 5.20 | 4.66 | 4.20 | 3.81 | 2.99 |
| 1988 | 100.0 | 0.0 | 100.0 | 5.27 | 4.78 | 4.36 | 4.02 | 2.97 |
| 1988 | 50.0 | 0.0 | 50.0 | 5.08 | 4.59 | 4.17 | 4.02 | 2.89 |
| 1988 | 0.0 | 50.0 | 0.0 | 5.05 | 4.52 | 4.08 | 3.92 | 2.90 |
| 1988 | 50.0 | 50.0 | 50.0 | 5.24 | 4.72 | 4.28 | 4.14 | 2.98 |
| 1988 | 20.6 | 27.3 | 20.6 | 5.05 | 4.54 | 4.11 | 3.95 | 2.89 |
| 1990 | 0.0 | 0.0 | 0.0 | 4.40 | 3.92 | 3.52 | 3.18 | 2.16 |
| 1990 | 0.0 | 100.0 | 0.0 | 4.97 | 4.38 | 3.89 | 3.49 | 2.40 |
| 1990 | 100.0 | 0.0 | 100.0 | 5.00 | 4.50 | 4.08 | 3.72 | 2.38 |
| 1990 | 50.0 | 0.0 | 50.0 | 4.83 | 4.33 | 3.90 | 3.54 | 2.32 |
| 1990 | 0.0 | 50.0 | 0.0 | 4.81 | 4.26 | 3.80 | 3.41 | 2.33 |
| 1990 | 50.0 | 50.0 | 50.0 | 4.98 | 4.44 | 3.99 | 3.60 | 2.39 |
| 1990 | 20.6 | 27.3 | 20.6 | 4.81 | 4.28 | 3.84 | 3.46 | 2.32 |
| 1995 | 0.0 | 0.0 | 0.0 | 4.10 | 3.64 | 3.24 | 2.91 | 1.78 |
| 1995 | 0.0 | 100.0 | 0.0 | 4.70 | 4.04 | 3.50 | 3.06 | 1.98 |
| 1995 | 100.0 | 0.0 | 100.0 | 4.55 | 4.08 | 3.68 | 3.33 | 1.97 |
| 1995 | 50.0 | 0.0 | 50.0 | 4.44 | 3.96 | 3.55 | 3.20 | 1.91 |
| 1995 | 0.0 | 50.0 | 0.0 | 4.52 | 3.94 | 3.45 | 3.05 | 1.91 |
| 1995 | 50.0 | 50.0 | 50.0 | 4.62 | 4.06 | 3.59 | 3.20 | 1.97 |
| 1995 | 20.6 | 27.3 | 20.6 | 4.47 | 3.94 | 3.49 | 3.11 | 1.91 |
| 2000 | 0.0 | 0.0 | 0.0 | 3.94 | 3.50 | 3.11 | 2.79 | 1.64 |
| 2000 | 0.0 | 100.0 | 0.0 | 4.57 | 3.89 | 3.34 | 2.89 | 1.83 |
| 2000 | 100.0 | 0.0 | 100.0 | 4.31 | 3.88 | 3.50 | 3.18 | 1.83 |
| 2000 | 50.0 | 0.0 | 50.0 | 4.23 | 3.78 | 3.39 | 3.06 | 1.77 |
| 2000 | 0.0 | 50.0 | 0.0 | 4.38 | 3.79 | 3.30 | 2.90 | 1.77 |
| 2000 | 50.0 | 50.0 | 50.0 | 4.44 | 3.88 | 3.42 | 3.04 | 1.83 |
| 2000 | 20.6 | 27.3 | 20.6 | 4.30 | 3.77 | 3.33 | 2.96 | 1.76 |

TABLE 36 : NOx AT 55.0 MPH.

# Appendix J

## EMISSION SENSITIVITY TABLES BY VEHICLE TYPE

Appendix J is the same as the Appendix I except that the emission factors are disaggregated by vehicle type. The LDGT category combines LDGT1s and LDGT2s.

## TABLE 1

## LOW ALTITUDE

## THC EMISSION FACTORS (GRAMS/MILE) AT 5.0 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | LDGV | | | | | LDGT | | | | | -LDDV- | -LDDT- | -HDDV- | HDGV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0°F | 25°F | 50°F | 75°F | 100°F | 0°F | 25°F | 50°F | 75°F | 100°F | 0-100F | 0-100F | 0-100F | |
| 1980 | 0.0 | 0.0 | 0.0 | 14.81 | 13.56 | 12.51 | 11.63 | 14.33 | 24.60 | 22.85 | 21.36 | 20.08 | 23.28 | 0.85 | 1.77 | 10.10 | 52.27 @ 0F |
| 1980 | 0.0 | 100.0 | 0.0 | 14.40 | 14.51 | 14.68 | 14.92 | 20.29 | 25.57 | 25.56 | 25.60 | 25.68 | 32.77 | 0.88 | 1.80 | 10.10 | 46.53 @ 25F |
| 1980 | 100.0 | 0.0 | 100.0 | 118.18 | 68.25 | 39.84 | 23.64 | 18.32 | 189.02 | 109.83 | 64.53 | 38.59 | 29.55 | 1.43 | 2.91 | 10.10 | 41.55 @ 50F |
| 1980 | 50.0 | 0.0 | 50.0 | 55.37 | 34.97 | 23.16 | 16.26 | 15.76 | 89.16 | 56.91 | 38.18 | 27.20 | 25.53 | 1.07 | 2.20 | 10.10 | 37.25 @ 75F |
| 1980 | 0.0 | 50.0 | 0.0 | 14.51 | 13.81 | 13.26 | 12.83 | 16.52 | 24.77 | 23.72 | 22.85 | 22.12 | 26.77 | 0.85 | 1.75 | 10.10 | 41.23 @100F |
| 1980 | 50.0 | 50.0 | 50.0 | 66.29 | 41.38 | 27.26 | 19.28 | 19.30 | 107.29 | 67.69 | 45.06 | 32.14 | 31.16 | 1.15 | 2.35 | 10.10 | |
| 1980 | 20.6 | 27.3 | 20.6 | 31.21 | 22.44 | 17.26 | 14.17 | 16.09 | 51.06 | 37.23 | 29.03 | 24.09 | 26.08 | 0.94 | 1.93 | 10.10 | |
| 1985 | 0.0 | 0.0 | 0.0 | 9.51 | 8.26 | 7.25 | 6.43 | 8.95 | 18.93 | 16.70 | 14.88 | 13.39 | 18.31 | 0.67 | 1.10 | 8.96 | 32.71 @ 0F |
| 1985 | 0.0 | 100.0 | 0.0 | 9.32 | 8.98 | 8.74 | 8.58 | 12.73 | 18.80 | 18.39 | 18.06 | 17.80 | 25.89 | 0.78 | 1.18 | 8.96 | 29.78 @ 25F |
| 1985 | 100.0 | 0.0 | 100.0 | 89.09 | 47.50 | 25.89 | 14.51 | 12.12 | 144.40 | 81.96 | 47.00 | 27.38 | 20.60 | 1.18 | 1.83 | 8.96 | 27.22 @ 50F |
| 1985 | 50.0 | 0.0 | 50.0 | 39.96 | 23.23 | 14.32 | 9.46 | 10.05 | 66.67 | 41.47 | 27.00 | 18.59 | 18.98 | 0.87 | 1.37 | 8.96 | 25.00 @ 75F |
| 1985 | 0.0 | 50.0 | 0.0 | 9.30 | 8.42 | 7.72 | 7.18 | 10.27 | 18.64 | 17.14 | 15.91 | 14.92 | 20.95 | 0.70 | 1.11 | 8.96 | 29.40 @100F |
| 1985 | 50.0 | 50.0 | 50.0 | 49.20 | 28.24 | 17.31 | 11.54 | 12.42 | 61.60 | 50.18 | 32.53 | 22.59 | 23.25 | 0.98 | 1.50 | 8.96 | |
| 1985 | 20.6 | 27.3 | 20.6 | 21.82 | 14.45 | 10.39 | 8.07 | 10.11 | 38.25 | 27.04 | 20.38 | 16.33 | 20.00 | 0.77 | 1.22 | 8.96 | |
| 1988 | 0.0 | 0.0 | 0.0 | 7.22 | 6.07 | 5.16 | 4.43 | 6.26 | 15.91 | 13.64 | 11.82 | 10.36 | 15.24 | 0.67 | 1.06 | 7.50 | 24.93 @ 0F |
| 1988 | 0.0 | 100.0 | 0.0 | 7.38 | 6.82 | 6.36 | 6.01 | 8.95 | 16.29 | 15.43 | 14.72 | 14.14 | 21.72 | 0.78 | 1.16 | 7.50 | 21.91 @ 25F |
| 1988 | 100.0 | 0.0 | 100.0 | 80.29 | 39.89 | 20.36 | 10.77 | 10.02 | 130.85 | 71.76 | 39.86 | 22.55 | 17.07 | 1.15 | 1.77 | 7.50 | 19.40 @ 50F |
| 1988 | 50.0 | 0.0 | 50.0 | 35.07 | 18.91 | 10.89 | 6.79 | 7.61 | 58.89 | 35.32 | 22.22 | 14.81 | 15.74 | 0.85 | 1.33 | 7.50 | 17.30 @ 75F |
| 1988 | 0.0 | 50.0 | 0.0 | 7.17 | 6.26 | 5.54 | 4.97 | 7.19 | 15.82 | 14.12 | 12.75 | 11.65 | 17.46 | 0.70 | 1.08 | 7.50 | 20.56 @100F |
| 1988 | 50.0 | 50.0 | 50.0 | 43.84 | 23.35 | 13.36 | 8.39 | 9.49 | 73.57 | 43.59 | 27.29 | 18.34 | 19.40 | 0.96 | 1.46 | 7.50 | |
| 1988 | 20.6 | 27.3 | 20.6 | 18.56 | 11.41 | 7.70 | 5.68 | 7.31 | 33.39 | 22.74 | 16.56 | 12.87 | 16.63 | 0.76 | 1.18 | 7.50 | |
| 1990 | 0.0 | 0.0 | 0.0 | 6.04 | 4.99 | 4.16 | 3.51 | 4.80 | 13.98 | 11.80 | 10.06 | 8.67 | 12.97 | 0.67 | 1.07 | 6.69 | 21.11 @ 0F |
| 1990 | 0.0 | 100.0 | 0.0 | 6.43 | 5.76 | 5.22 | 4.78 | 6.94 | 14.51 | 13.48 | 12.63 | 11.93 | 18.52 | 0.77 | 1.17 | 6.69 | 18.20 @ 25F |
| 1990 | 100.0 | 0.0 | 100.0 | 76.19 | 36.22 | 17.68 | 8.96 | 9.11 | 123.63 | 65.53 | 35.34 | 19.49 | 15.43 | 1.14 | 1.78 | 6.69 | 15.82 @ 50F |
| 1990 | 50.0 | 0.0 | 50.0 | 32.80 | 16.35 | 9.27 | 5.54 | 6.39 | 54.87 | 31.76 | 19.39 | 12.61 | 13.73 | 0.85 | 1.34 | 6.69 | 13.88 @ 75F |
| 1990 | 0.0 | 50.0 | 0.0 | 6.09 | 5.20 | 4.50 | 3.94 | 5.54 | 13.97 | 12.25 | 10.88 | 9.78 | 14.86 | 0.70 | 1.09 | 6.69 | 16.58 @100F |
| 1990 | 50.0 | 50.0 | 50.0 | 41.31 | 20.99 | 11.45 | 6.87 | 8.02 | 69.07 | 39.50 | 23.93 | 15.71 | 16.97 | 0.96 | 1.48 | 6.69 | |
| 1990 | 20.6 | 27.3 | 20.6 | 16.99 | 9.95 | 6.43 | 4.57 | 5.84 | 30.64 | 20.18 | 14.30 | 10.87 | 14.29 | 0.76 | 1.19 | 6.69 | |
| 1995 | 0.0 | 0.0 | 0.0 | 4.25 | 3.44 | 2.81 | 2.31 | 2.59 | 9.95 | 8.10 | 6.65 | 5.51 | 7.92 | 0.69 | 1.12 | 5.70 | 17.50 @ 0F |
| 1995 | 0.0 | 100.0 | 0.0 | 4.98 | 4.23 | 3.61 | 3.10 | 3.93 | 10.82 | 9.52 | 8.45 | 7.56 | 11.42 | 0.79 | 1.26 | 5.70 | 14.63 @ 25F |
| 1995 | 100.0 | 0.0 | 100.0 | 69.06 | 30.50 | 13.70 | 6.36 | 7.85 | 107.08 | 51.81 | 25.64 | 13.08 | 12.27 | 1.14 | 1.88 | 5.70 | 12.33 @ 50F |
| 1995 | 50.0 | 0.0 | 50.0 | 29.15 | 13.80 | 6.95 | 3.84 | 4.58 | 46.39 | 24.40 | 13.67 | 8.26 | 9.47 | 0.86 | 1.41 | 5.70 | 10.49 @ 75F |
| 1995 | 0.0 | 50.0 | 0.0 | 4.46 | 3.68 | 3.07 | 2.58 | 3.06 | 10.11 | 8.50 | 7.22 | 6.20 | 9.10 | 0.72 | 1.16 | 5.70 | 12.47 @100F |
| 1995 | 50.0 | 50.0 | 50.0 | 37.02 | 17.36 | 8.66 | 4.73 | 5.89 | 58.95 | 30.67 | 17.05 | 10.32 | 11.84 | 0.97 | 1.57 | 5.70 | |
| 1995 | 20.6 | 27.3 | 20.6 | 14.53 | 7.80 | 4.64 | 3.08 | 3.66 | 24.90 | 14.96 | 9.82 | 7.00 | 9.19 | 0.78 | 1.26 | 5.70 | |
| 2000 | 0.0 | 0.0 | 0.0 | 3.77 | 3.04 | 2.48 | 2.04 | 2.04 | 7.33 | 5.87 | 4.73 | 3.84 | 4.58 | 0.72 | 1.18 | 5.35 | 16.37 @ 0F |
| 2000 | 0.0 | 100.0 | 0.0 | 4.51 | 3.79 | 3.19 | 2.70 | 3.18 | 8.42 | 7.09 | 6.00 | 5.11 | 6.81 | 0.82 | 1.34 | 5.35 | 13.50 @ 25F |
| 2000 | 100.0 | 0.0 | 100.0 | 64.75 | 28.06 | 12.33 | 5.58 | 7.35 | 96.07 | 43.08 | 19.65 | 9.24 | 10.68 | 1.16 | 1.98 | 5.35 | 11.22 @ 50F |
| 2000 | 50.0 | 0.0 | 50.0 | 27.28 | 12.66 | 6.25 | 3.38 | 4.06 | 41.12 | 19.97 | 10.33 | 5.83 | 6.86 | 0.89 | 1.48 | 5.35 | 9.40 @ 75F |
| 2000 | 0.0 | 50.0 | 0.0 | 3.99 | 3.28 | 2.71 | 2.27 | 2.45 | 7.62 | 6.23 | 5.14 | 4.26 | 5.35 | 0.75 | 1.22 | 5.35 | 11.16 @100F |
| 2000 | 50.0 | 50.0 | 50.0 | 34.63 | 15.92 | 7.76 | 4.14 | 5.26 | 52.24 | 25.08 | 12.83 | 7.18 | 8.75 | 0.99 | 1.66 | 5.35 | |
| 2000 | 20.6 | 27.3 | 20.6 | 13.49 | 7.10 | 4.14 | 2.71 | 3.09 | 21.27 | 11.82 | 7.23 | 4.88 | 5.93 | 0.80 | 1.32 | 5.35 | |

## TABLE 2

## LOW ALTITUDE

### THC EMISSION FACTORS (GRAMS/MILE) AT 10.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | LDGV 0°F | 25°F | 50°F | 75°F | 100°F | LDGT 0°F | 25°F | 50°F | 75°F | 100°F | -LDDV- 0-100F | -LDDT- 0-100F | -HDDV- 0-100F | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 9.01 | 8.29 | 7.69 | 7.19 | 8.75 | 14.69 | 13.72 | 12.89 | 12.19 | 13.99 | 0.67 | 1.39 | 7.93 | |
| 1980 | 0.0 | 100.0 | 0.0 | 8.78 | 8.82 | 8.89 | 8.99 | 11.99 | 15.11 | 15.09 | 15.09 | 15.11 | 18.93 | 0.69 | 1.41 | 7.93 | 36.95 @ 0F |
| 1980 | 100.0 | 0.0 | 100.0 | 65.57 | 38.20 | 22.65 | 13.80 | 10.86 | 100.79 | 59.22 | 35.47 | 21.88 | 17.12 | 1.12 | 2.28 | 7.93 | 33.18 @ 25F |
| 1980 | 50.0 | 0.0 | 50.0 | 31.14 | 19.97 | 13.50 | 9.73 | 9.50 | 48.48 | 31.53 | 21.69 | 15.92 | 15.11 | 0.84 | 1.73 | 7.93 | 29.93 @ 50F |
| 1980 | 0.0 | 50.0 | 0.0 | 8.84 | 8.43 | 8.10 | 7.84 | 9.93 | 14.74 | 14.15 | 13.66 | 13.25 | 15.81 | 0.66 | 1.38 | 7.93 | 27.10 @ 75F |
| 1980 | 50.0 | 50.0 | 50.0 | 37.18 | 23.51 | 15.77 | 11.39 | 11.42 | 57.95 | 37.15 | 25.28 | 18.49 | 18.02 | 0.90 | 1.85 | 7.93 | 29.71 @100F |
| 1980 | 20.6 | 27.3 | 20.6 | 17.96 | 13.13 | 10.29 | 8.58 | 9.69 | 28.52 | 21.23 | 16.90 | 14.28 | 15.43 | 0.74 | 1.52 | 7.93 | |
| 1985 | 0.0 | 0.0 | 0.0 | 6.15 | 5.35 | 4.72 | 4.21 | 5.73 | 12.03 | 10.61 | 9.46 | 8.52 | 11.69 | 0.53 | 0.86 | 7.03 | |
| 1985 | 0.0 | 100.0 | 0.0 | 6.14 | 5.87 | 5.66 | 5.51 | 8.00 | 11.88 | 11.58 | 11.34 | 11.13 | 16.16 | 0.61 | 0.93 | 7.03 | 24.07 @ 0F |
| 1985 | 100.0 | 0.0 | 100.0 | 56.37 | 29.76 | 16.19 | 9.16 | 7.87 | 85.28 | 48.60 | 28.13 | 16.69 | 12.71 | 0.92 | 1.43 | 7.03 | 22.15 @ 25F |
| 1985 | 50.0 | 0.0 | 50.0 | 25.31 | 14.64 | 9.06 | 6.06 | 6.48 | 39.75 | 24.95 | 16.46 | 11.54 | 11.95 | 0.68 | 1.08 | 7.03 | 20.47 @ 50F |
| 1985 | 0.0 | 50.0 | 0.0 | 6.06 | 5.48 | 5.02 | 4.66 | 6.52 | 11.83 | 10.86 | 10.07 | 9.42 | 13.24 | 0.55 | 0.87 | 7.03 | 19.02 @ 75F |
| 1985 | 50.0 | 50.0 | 50.0 | 31.25 | 17.82 | 10.93 | 7.34 | 7.93 | 48.58 | 30.09 | 19.73 | 13.91 | 14.44 | 0.77 | 1.18 | 7.03 | 21.90 @100F |
| 1985 | 20.6 | 27.3 | 20.6 | 13.92 | 9.21 | 6.65 | 5.21 | 6.46 | 23.23 | 16.59 | 12.64 | 10.23 | 12.63 | 0.60 | 0.96 | 7.03 | |
| 1988 | 0.0 | 0.0 | 0.0 | 4.95 | 4.18 | 3.57 | 3.09 | 4.21 | 10.49 | 8.99 | 7.79 | 6.83 | 10.06 | 0.53 | 0.84 | 5.89 | |
| 1988 | 0.0 | 100.0 | 0.0 | 5.18 | 4.75 | 4.40 | 4.12 | 5.95 | 10.74 | 10.13 | 9.62 | 9.20 | 14.09 | 0.61 | 0.91 | 5.89 | 17.92 @ 0F |
| 1988 | 100.0 | 0.0 | 100.0 | 55.31 | 27.14 | 13.76 | 7.29 | 7.02 | 82.31 | 45.07 | 25.13 | 14.38 | 11.02 | 0.90 | 1.39 | 5.89 | 15.94 @ 25F |
| 1988 | 50.0 | 0.0 | 50.0 | 24.13 | 12.89 | 7.41 | 4.65 | 5.24 | 37.23 | 22.39 | 14.19 | 9.57 | 10.30 | 0.67 | 1.05 | 5.89 | 14.29 @ 50F |
| 1988 | 0.0 | 50.0 | 0.0 | 4.96 | 4.34 | 3.84 | 3.44 | 4.81 | 10.44 | 9.30 | 8.38 | 7.63 | 11.43 | 0.55 | 0.85 | 5.89 | 12.92 @ 75F |
| 1988 | 50.0 | 50.0 | 50.0 | 30.24 | 15.94 | 9.08 | 5.71 | 6.49 | 46.53 | 27.60 | 17.37 | 11.79 | 12.56 | 0.76 | 1.15 | 5.89 | 15.06 @100F |
| 1988 | 20.6 | 27.3 | 20.6 | 12.79 | 7.82 | 5.28 | 3.92 | 4.95 | 21.36 | 14.61 | 10.71 | 8.38 | 10.89 | 0.60 | 0.93 | 5.89 | |
| 1990 | 0.0 | 0.0 | 0.0 | 4.34 | 3.61 | 3.03 | 2.58 | 3.38 | 9.49 | 8.01 | 6.83 | 5.89 | 8.77 | 0.53 | 0.84 | 5.25 | |
| 1990 | 0.0 | 100.0 | 0.0 | 4.71 | 4.20 | 3.79 | 3.45 | 4.84 | 9.86 | 9.12 | 8.50 | 7.99 | 12.33 | 0.61 | 0.92 | 5.25 | 15.06 @ 0F |
| 1990 | 100.0 | 0.0 | 100.0 | 54.97 | 25.89 | 12.57 | 6.39 | 6.68 | 81.42 | 42.91 | 23.12 | 12.64 | 10.35 | 0.89 | 1.40 | 5.25 | 13.16 @ 25F |
| 1990 | 50.0 | 0.0 | 50.0 | 23.65 | 12.07 | 6.63 | 4.00 | 4.61 | 36.24 | 20.94 | 12.82 | 8.41 | 9.26 | 0.67 | 1.05 | 5.25 | 11.60 @ 50F |
| 1990 | 0.0 | 50.0 | 0.0 | 4.41 | 3.78 | 3.28 | 2.88 | 3.89 | 9.49 | 8.31 | 7.36 | 6.60 | 9.97 | 0.55 | 0.86 | 5.25 | 10.33 @ 75F |
| 1990 | 50.0 | 50.0 | 50.0 | 29.84 | 15.05 | 8.18 | 4.92 | 5.76 | 45.64 | 26.01 | 15.81 | 10.42 | 11.34 | 0.75 | 1.16 | 5.25 | 12.10 @100F |
| 1990 | 20.6 | 27.3 | 20.6 | 12.26 | 7.15 | 4.63 | 3.32 | 4.15 | 20.40 | 13.44 | 9.56 | 7.30 | 9.61 | 0.60 | 0.93 | 5.25 | |
| 1995 | 0.0 | 0.0 | 0.0 | 3.34 | 2.73 | 2.25 | 1.88 | 2.05 | 7.30 | 5.97 | 4.92 | 4.10 | 5.75 | 0.54 | 0.88 | 4.47 | |
| 1995 | 0.0 | 100.0 | 0.0 | 3.91 | 3.33 | 2.86 | 2.47 | 3.06 | 7.94 | 6.98 | 6.19 | 5.54 | 8.20 | 0.62 | 0.99 | 4.47 | 12.32 @ 0F |
| 1995 | 100.0 | 0.0 | 100.0 | 52.82 | 23.34 | 10.53 | 4.94 | 6.12 | 77.47 | 37.26 | 18.39 | 9.42 | 9.04 | 0.90 | 1.48 | 4.47 | 10.45 @ 25F |
| 1995 | 50.0 | 0.0 | 50.0 | 22.35 | 10.62 | 5.40 | 3.03 | 3.60 | 33.65 | 17.65 | 9.90 | 6.03 | 6.93 | 0.68 | 1.11 | 4.47 | 8.94 @ 50F |
| 1995 | 0.0 | 50.0 | 0.0 | 3.50 | 2.91 | 2.45 | 2.08 | 2.41 | 7.42 | 6.25 | 5.32 | 4.58 | 6.58 | 0.57 | 0.91 | 4.47 | 7.73 @ 75F |
| 1995 | 50.0 | 50.0 | 50.0 | 28.37 | 13.33 | 6.69 | 3.71 | 4.59 | 42.71 | 22.12 | 12.29 | 7.48 | 8.62 | 0.76 | 1.23 | 4.47 | 9.03 @100F |
| 1995 | 20.6 | 27.3 | 20.6 | 11.19 | 6.05 | 3.64 | 2.46 | 2.88 | 18.11 | 10.89 | 7.17 | 5.14 | 6.68 | 0.61 | 0.99 | 4.47 | |
| 2000 | 0.0 | 0.0 | 0.0 | 3.03 | 2.47 | 2.03 | 1.70 | 1.70 | 5.72 | 4.61 | 3.75 | 3.08 | 3.60 | 0.56 | 0.92 | 4.20 | |
| 2000 | 0.0 | 100.0 | 0.0 | 3.61 | 3.04 | 2.58 | 2.21 | 2.57 | 6.53 | 5.53 | 4.70 | 4.03 | 5.27 | 0.64 | 1.05 | 4.20 | 11.48 @ 0F |
| 2000 | 100.0 | 0.0 | 100.0 | 50.11 | 21.78 | 9.64 | 4.43 | 5.79 | 73.09 | 32.79 | 15.01 | 7.13 | 8.29 | 0.91 | 1.53 | 4.20 | 9.60 @ 25F |
| 2000 | 50.0 | 0.0 | 50.0 | 21.18 | 9.90 | 4.94 | 2.73 | 3.26 | 31.39 | 15.30 | 7.98 | 4.57 | 5.36 | 0.70 | 1.16 | 4.20 | 8.11 @ 50F |
| 2000 | 0.0 | 50.0 | 0.0 | 3.20 | 2.65 | 2.22 | 1.87 | 2.01 | 5.93 | 4.88 | 4.05 | 3.39 | 4.18 | 0.59 | 0.96 | 4.20 | 6.92 @ 75F |
| 2000 | 50.0 | 50.0 | 50.0 | 26.86 | 12.41 | 6.11 | 3.32 | 4.18 | 39.81 | 19.16 | 9.86 | 5.58 | 6.78 | 0.78 | 1.30 | 4.20 | 8.07 @100F |
| 2000 | 20.6 | 27.3 | 20.6 | 10.53 | 5.60 | 3.32 | 2.21 | 2.50 | 16.31 | 9.12 | 5.64 | 3.86 | 4.63 | 0.63 | 1.04 | 4.20 | |

TABLE 2 : THC AT 10.0 MPH.

## TABLE 3

## LOW ALTITUDE

### THC EMISSION FACTORS (GRAMS/MILE) AT 19.6 MPH

| Cal. Year | Cold/Hot Start VMT Percentages | | | LDGV | | | | | LDGT | | | | | -LDDV- | -LDDT- | -HDDV- | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PCCN | PCHC | PCCC | 0°F | 25°F | 50°F | 75°F | 100°F | 0°F | 25°F | 50°F | 75°F | 100°F | 0-100F | 0-100F | 0-100F | |
| 1980 | 0.0 | 0.0 | 0.0 | 6.01 | 5.59 | 5.25 | 4.96 | 5.86 | 9.81 | 9.25 | 8.78 | 8.38 | 9.42 | 0.45 | 0.93 | 5.30 | 22.35 @ 0F |
| 1980 | 0.0 | 100.0 | 0.0 | 5.87 | 5.89 | 5.92 | 5.97 | 7.68 | 10.01 | 9.99 | 9.98 | 9.98 | 12.13 | 0.46 | 0.94 | 5.30 | 20.48 @ 25F |
| 1980 | 100.0 | 0.0 | 100.0 | 38.04 | 22.52 | 13.71 | 8.70 | 7.02 | 57.73 | 34.55 | 21.32 | 13.75 | 11.09 | 0.75 | 1.53 | 5.30 | 18.85 @ 50F |
| 1980 | 50.0 | 0.0 | 50.0 | 18.55 | 12.21 | 8.54 | 6.40 | 6.27 | 28.64 | 19.17 | 13.67 | 10.44 | 10.02 | 0.56 | 1.15 | 5.30 | 17.44 @ 75F |
| 1980 | 0.0 | 50.0 | 0.0 | 5.91 | 5.67 | 5.48 | 5.32 | 6.52 | 9.82 | 9.48 | 9.20 | 8.96 | 10.42 | 0.44 | 0.92 | 5.30 | 18.74 @100F |
| 1980 | 50.0 | 50.0 | 50.0 | 21.95 | 14.21 | 9.82 | 7.33 | 7.35 | 33.87 | 22.27 | 15.65 | 11.86 | 11.61 | 0.60 | 1.24 | 5.30 | |
| 1980 | 20.6 | 27.3 | 20.6 | 11.08 | 8.34 | 6.71 | 5.74 | 6.38 | 17.51 | 13.43 | 11.00 | 9.53 | 10.20 | 0.49 | 1.01 | 5.30 | |
| 1985 | 0.0 | 0.0 | 0.0 | 4.04 | 3.57 | 3.20 | 2.90 | 3.78 | 7.68 | 6.87 | 6.21 | 5.67 | 7.49 | 0.35 | 0.58 | 4.70 | 15.84 @ 0F |
| 1985 | 0.0 | 100.0 | 0.0 | 4.04 | 3.88 | 3.75 | 3.65 | 5.07 | 7.55 | 7.39 | 7.24 | 7.13 | 9.98 | 0.41 | 0.62 | 4.70 | 14.88 @ 25F |
| 1985 | 100.0 | 0.0 | 100.0 | 33.54 | 17.83 | 9.87 | 5.77 | 5.06 | 48.66 | 28.11 | 16.64 | 10.24 | 8.00 | 0.62 | 0.96 | 4.70 | 14.05 @ 50F |
| 1985 | 50.0 | 0.0 | 50.0 | 15.30 | 9.00 | 5.72 | 3.97 | 4.23 | 23.20 | 14.89 | 10.12 | 7.36 | 7.61 | 0.45 | 0.72 | 4.70 | 13.32 @ 75F |
| 1985 | 0.0 | 50.0 | 0.0 | 3.99 | 3.65 | 3.38 | 3.16 | 4.23 | 7.55 | 6.99 | 6.54 | 6.17 | 8.35 | 0.37 | 0.58 | 4.70 | 14.76 @100F |
| 1985 | 50.0 | 50.0 | 50.0 | 18.79 | 10.85 | 6.81 | 4.71 | 5.07 | 28.11 | 17.75 | 11.94 | 8.68 | 8.99 | 0.51 | 0.79 | 4.70 | |
| 1985 | 20.6 | 27.3 | 20.6 | 8.61 | 5.83 | 4.32 | 3.48 | 4.21 | 13.94 | 10.21 | 7.98 | 6.63 | 8.00 | 0.40 | 0.64 | 4.70 | |
| 1988 | 0.0 | 0.0 | 0.0 | 3.28 | 2.82 | 2.45 | 2.16 | 2.81 | 6.58 | 5.72 | 5.04 | 4.49 | 6.33 | 0.35 | 0.56 | 3.94 | 11.24 @ 0F |
| 1988 | 0.0 | 100.0 | 0.0 | 3.43 | 3.16 | 2.95 | 2.77 | 3.83 | 6.68 | 6.34 | 6.05 | 5.81 | 8.58 | 0.41 | 0.61 | 3.94 | 10.26 @ 25F |
| 1988 | 100.0 | 0.0 | 100.0 | 33.80 | 16.64 | 8.55 | 4.67 | 4.57 | 46.90 | 25.95 | 14.74 | 8.71 | 6.84 | 0.60 | 0.93 | 3.94 | 9.43 @ 50F |
| 1988 | 50.0 | 0.0 | 50.0 | 14.91 | 8.07 | 4.75 | 3.09 | 3.45 | 21.60 | 13.24 | 8.62 | 6.02 | 6.45 | 0.45 | 0.70 | 3.94 | 8.75 @ 75F |
| 1988 | 0.0 | 50.0 | 0.0 | 3.29 | 2.91 | 2.61 | 2.37 | 3.16 | 6.53 | 5.88 | 5.36 | 4.94 | 7.10 | 0.37 | 0.57 | 3.94 | 9.81 @100F |
| 1988 | 50.0 | 50.0 | 50.0 | 18.61 | 9.90 | 5.75 | 3.72 | 4.20 | 26.79 | 16.15 | 10.40 | 7.26 | 7.71 | 0.51 | 0.77 | 3.94 | |
| 1988 | 20.6 | 27.3 | 20.6 | 8.03 | 5.01 | 3.48 | 2.65 | 3.26 | 12.68 | 8.87 | 6.67 | 5.36 | 6.79 | 0.40 | 0.62 | 3.94 | |
| 1990 | 0.0 | 0.0 | 0.0 | 2.90 | 2.46 | 2.11 | 1.83 | 2.30 | 5.95 | 5.10 | 4.42 | 3.88 | 5.51 | 0.35 | 0.56 | 3.51 | 9.31 @ 0F |
| 1990 | 0.0 | 100.0 | 0.0 | 3.14 | 2.82 | 2.57 | 2.36 | 3.17 | 6.14 | 5.72 | 5.36 | 5.06 | 7.52 | 0.41 | 0.61 | 3.51 | 8.36 @ 25F |
| 1990 | 100.0 | 0.0 | 100.0 | 34.12 | 16.12 | 7.93 | 4.14 | 4.38 | 47.11 | 24.98 | 13.66 | 7.81 | 6.45 | 0.60 | 0.94 | 3.51 | 7.58 @ 50F |
| 1990 | 50.0 | 0.0 | 50.0 | 14.82 | 7.66 | 4.31 | 2.69 | 3.07 | 21.29 | 12.47 | 7.82 | 5.30 | 5.80 | 0.45 | 0.70 | 3.51 | 6.95 @ 75F |
| 1990 | 0.0 | 50.0 | 0.0 | 2.95 | 2.56 | 2.26 | 2.01 | 2.60 | 5.94 | 5.26 | 4.72 | 4.28 | 6.19 | 0.37 | 0.57 | 3.51 | 7.83 @100F |
| 1990 | 50.0 | 50.0 | 50.0 | 18.63 | 9.47 | 5.25 | 3.25 | 3.78 | 26.63 | 15.35 | 9.51 | 6.44 | 6.99 | 0.50 | 0.77 | 3.51 | |
| 1990 | 20.6 | 27.3 | 20.6 | 7.79 | 4.64 | 3.08 | 2.28 | 2.77 | 12.20 | 8.19 | 5.97 | 4.67 | 6.00 | 0.40 | 0.62 | 3.51 | |
| 1995 | 0.0 | 0.0 | 0.0 | 2.31 | 1.92 | 1.62 | 1.39 | 1.49 | 4.67 | 3.88 | 3.26 | 2.77 | 3.71 | 0.36 | 0.59 | 2.99 | 7.40 @ 0F |
| 1995 | 0.0 | 100.0 | 0.0 | 2.67 | 2.31 | 2.01 | 1.76 | 2.12 | 5.06 | 4.48 | 4.01 | 3.61 | 5.14 | 0.41 | 0.66 | 2.99 | 6.46 @ 25F |
| 1995 | 100.0 | 0.0 | 100.0 | 33.62 | 14.94 | 6.84 | 3.32 | 4.08 | 46.85 | 22.56 | 11.24 | 5.89 | 5.77 | 0.60 | 0.99 | 2.99 | 5.71 @ 50F |
| 1995 | 50.0 | 0.0 | 50.0 | 14.34 | 6.91 | 3.61 | 2.11 | 2.47 | 20.55 | 10.87 | 6.22 | 3.91 | 4.45 | 0.45 | 0.74 | 2.99 | 5.11 @ 75F |
| 1995 | 0.0 | 50.0 | 0.0 | 2.41 | 2.04 | 1.75 | 1.52 | 1.71 | 4.75 | 4.05 | 3.50 | 3.05 | 4.19 | 0.38 | 0.61 | 2.99 | 5.76 @100F |
| 1995 | 50.0 | 50.0 | 50.0 | 18.14 | 8.62 | 4.42 | 2.54 | 3.10 | 25.95 | 13.52 | 7.62 | 4.75 | 5.46 | 0.51 | 0.82 | 2.99 | |
| 1995 | 20.6 | 27.3 | 20.6 | 7.28 | 4.02 | 2.50 | 1.75 | 2.01 | 11.19 | 6.82 | 4.59 | 3.38 | 4.27 | 0.41 | 0.66 | 2.99 | |
| 2000 | 0.0 | 0.0 | 0.0 | 2.12 | 1.76 | 1.49 | 1.27 | 1.27 | 3.81 | 3.13 | 2.59 | 2.18 | 2.47 | 0.38 | 0.62 | 2.81 | 6.83 @ 0F |
| 2000 | 0.0 | 100.0 | 0.0 | 2.49 | 2.13 | 1.84 | 1.60 | 1.83 | 4.31 | 3.69 | 3.18 | 2.76 | 3.50 | 0.43 | 0.70 | 2.81 | 5.89 @ 25F |
| 2000 | 100.0 | 0.0 | 100.0 | 32.14 | 14.08 | 6.34 | 3.02 | 3.88 | 45.82 | 20.63 | 9.56 | 4.66 | 5.45 | 0.61 | 1.04 | 2.81 | 5.15 @ 50F |
| 2000 | 50.0 | 0.0 | 50.0 | 13.69 | 6.50 | 3.34 | 1.93 | 2.27 | 19.84 | 9.77 | 5.21 | 3.09 | 3.58 | 0.46 | 0.78 | 2.81 | 4.56 @ 75F |
| 2000 | 0.0 | 50.0 | 0.0 | 2.23 | 1.88 | 1.60 | 1.38 | 1.47 | 3.94 | 3.29 | 2.78 | 2.37 | 2.82 | 0.39 | 0.64 | 2.81 | 5.13 @100F |
| 2000 | 50.0 | 50.0 | 50.0 | 17.31 | 8.10 | 4.09 | 2.31 | 2.86 | 25.06 | 12.16 | 6.37 | 3.71 | 4.47 | 0.52 | 0.87 | 2.81 | |
| 2000 | 20.6 | 27.3 | 20.6 | 6.91 | 3.76 | 2.31 | 1.60 | 1.79 | 10.43 | 5.93 | 3.76 | 2.65 | 3.11 | 0.42 | 0.69 | 2.81 | |

TABLE 3 : THC AT 19.6 MPH.

## TABLE 4

## LOW ALTITUDE

### THC EMISSION FACTORS (GRAMS/MILE) AT 35.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | LDGV 0°F | 25°F | 50°F | 75°F | 100°F | LDGT 0°F | 25°F | 50°F | 75°F | 100°F | -LDDV- 0-100F | -LDDT- 0-100F | -HDDV- 0-100F | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 4.34 | 4.12 | 3.93 | 3.77 | 4.24 | 7.21 | 6.90 | 6.63 | 6.40 | 6.97 | 0.28 | 0.58 | 3.29 | 14.38 @ 0F |
| 1980 | 0.0 | 100.0 | 0.0 | 4.28 | 4.29 | 4.31 | 4.33 | 5.27 | 7.32 | 7.31 | 7.30 | 7.30 | 8.49 | 0.29 | 0.59 | 3.29 | 13.53 @ 25F |
| 1980 | 100.0 | 0.0 | 100.0 | 22.76 | 13.85 | 8.79 | 5.90 | 4.93 | 34.93 | 21.52 | 13.86 | 9.48 | 7.93 | 0.46 | 0.95 | 3.29 | 12.80 @ 50F |
| 1980 | 50.0 | 0.0 | 50.0 | 11.59 | 7.94 | 5.83 | 4.59 | 4.49 | 18.15 | 12.65 | 9.46 | 7.59 | 7.31 | 0.35 | 0.72 | 3.29 | 12.16 @ 75F |
| 1980 | 0.0 | 50.0 | 0.0 | 4.29 | 4.16 | 4.06 | 3.97 | 4.62 | 7.22 | 7.03 | 6.87 | 6.73 | 7.53 | 0.28 | 0.57 | 3.29 | 12.75 @100F |
| 1980 | 50.0 | 50.0 | 50.0 | 13.52 | 9.07 | 6.55 | 5.12 | 5.10 | 21.13 | 14.41 | 10.58 | 8.39 | 8.21 | 0.37 | 0.77 | 3.29 | |
| 1980 | 20.6 | 27.3 | 20.6 | 7.28 | 5.70 | 4.77 | 4.22 | 4.55 | 11.69 | 9.32 | 7.91 | 7.06 | 7.41 | 0.30 | 0.63 | 3.29 | |
| 1985 | 0.0 | 0.0 | 0.0 | 2.71 | 2.47 | 2.27 | 2.11 | 2.56 | 5.05 | 4.63 | 4.29 | 4.01 | 4.94 | 0.22 | 0.36 | 2.92 | 11.34 @ 0F |
| 1985 | 0.0 | 100.0 | 0.0 | 2.72 | 2.63 | 2.56 | 2.51 | 3.26 | 4.98 | 4.90 | 4.83 | 4.77 | 6.25 | 0.25 | 0.38 | 2.92 | 10.91 @ 25F |
| 1985 | 100.0 | 0.0 | 100.0 | 18.72 | 10.20 | 5.89 | 3.66 | 3.29 | 26.96 | 16.00 | 9.87 | 6.44 | 5.25 | 0.38 | 0.59 | 2.92 | 10.53 @ 50F |
| 1985 | 50.0 | 0.0 | 50.0 | 8.85 | 5.42 | 3.64 | 2.69 | 2.82 | 13.39 | 8.95 | 6.40 | 4.91 | 5.02 | 0.28 | 0.45 | 2.92 | 10.21 @ 75F |
| 1985 | 0.0 | 50.0 | 0.0 | 2.69 | 2.51 | 2.36 | 2.25 | 2.81 | 4.98 | 4.70 | 4.47 | 4.28 | 5.39 | 0.23 | 0.36 | 2.92 | 10.86 @100F |
| 1985 | 50.0 | 50.0 | 50.0 | 10.72 | 6.42 | 4.22 | 3.09 | 3.27 | 15.97 | 10.45 | 7.35 | 5.61 | 5.75 | 0.32 | 0.49 | 2.92 | |
| 1985 | 20.6 | 27.3 | 20.6 | 5.20 | 3.69 | 2.88 | 2.42 | 2.80 | 8.42 | 6.43 | 5.24 | 4.52 | 5.22 | 0.25 | 0.40 | 2.92 | |
| 1988 | 0.0 | 0.0 | 0.0 | 2.14 | 1.90 | 1.71 | 1.56 | 1.89 | 4.12 | 3.69 | 3.35 | 3.07 | 3.99 | 0.22 | 0.35 | 2.44 | 7.60 @ 0F |
| 1988 | 0.0 | 100.0 | 0.0 | 2.23 | 2.09 | 1.97 | 1.88 | 2.43 | 4.17 | 4.00 | 3.86 | 3.75 | 5.15 | 0.25 | 0.38 | 2.44 | 7.15 @ 25F |
| 1988 | 100.0 | 0.0 | 100.0 | 18.62 | 9.35 | 4.98 | 2.89 | 2.86 | 25.01 | 14.18 | 8.37 | 5.25 | 4.29 | 0.37 | 0.58 | 2.44 | 6.78 @ 50F |
| 1388 | 50.0 | 0.0 | 50.0 | 8.44 | 4.73 | 2.95 | 2.05 | 2.24 | 11.94 | 7.60 | 5.21 | 3.86 | 4.07 | 0.28 | 0.43 | 2.44 | 6.47 @ 75F |
| 1988 | 0.0 | 50.0 | 0.0 | 2.15 | 1.95 | 1.79 | 1.67 | 2.07 | 4.10 | 3.77 | 3.51 | 3.30 | 4.39 | 0.23 | 0.35 | 2.44 | 6.95 @100F |
| 1988 | 50.0 | 50.0 | 50.0 | 10.42 | 5.72 | 3.48 | 2.38 | 2.64 | 14.59 | 9.09 | 6.12 | 4.50 | 4.72 | 0.31 | 0.48 | 2.44 | |
| 1988 | 20.6 | 27.3 | 20.6 | 4.72 | 3.08 | 2.26 | 1.82 | 2.13 | 7.30 | 5.33 | 4.19 | 3.52 | 4.23 | 0.25 | 0.39 | 2.44 | |
| 1990 | 0.0 | 0.0 | 0.0 | 1.89 | 1.65 | 1.46 | 1.32 | 1.55 | 3.66 | 3.23 | 2.89 | 2.61 | 3.43 | 0.22 | 0.35 | 2.18 | 6.17 @ 0F |
| 1990 | 0.0 | 100.0 | 0.0 | 2.02 | 1.85 | 1.71 | 1.59 | 2.02 | 3.76 | 3.55 | 3.37 | 3.22 | 4.45 | 0.25 | 0.38 | 2.18 | 5.74 @ 25F |
| 1990 | 100.0 | 0.0 | 100.0 | 18.80 | 9.04 | 4.60 | 2.56 | 2.71 | 24.97 | 13.50 | 7.65 | 4.63 | 3.95 | 0.37 | 0.58 | 2.18 | 5.39 @ 50F |
| 1990 | 50.0 | 0.0 | 50.0 | 8.36 | 4.46 | 2.65 | 1.78 | 1.98 | 11.63 | 7.05 | 4.65 | 3.34 | 3.59 | 0.28 | 0.44 | 2.18 | 5.10 @ 75F |
| 1990 | 0.0 | 50.0 | 0.0 | 1.91 | 1.71 | 1.54 | 1.41 | 1.71 | 3.66 | 3.32 | 3.04 | 2.82 | 3.78 | 0.23 | 0.36 | 2.18 | 5.50 @100F |
| 1990 | 50.0 | 50.0 | 50.0 | 10.41 | 5.44 | 3.15 | 2.08 | 2.36 | 14.37 | 8.52 | 5.51 | 3.92 | 4.20 | 0.31 | 0.48 | 2.18 | |
| 1990 | 20.6 | 27.3 | 20.6 | 4.54 | 2.83 | 1.99 | 1.56 | 1.81 | 6.91 | 4.83 | 3.69 | 3.02 | 3.68 | 0.25 | 0.39 | 2.18 | |
| 1995 | 0.0 | 0.0 | 0.0 | 1.52 | 1.31 | 1.14 | 1.02 | 1.07 | 2.85 | 2.43 | 2.11 | 1.85 | 2.32 | 0.23 | 0.37 | 1.86 | 4.71 @ 0F |
| 1995 | 0.0 | 100.0 | 0.0 | 1.72 | 1.52 | 1.35 | 1.22 | 1.41 | 3.05 | 2.75 | 2.49 | 2.29 | 3.06 | 0.26 | 0.41 | 1.86 | 4.29 @ 25F |
| 1995 | 100.0 | 0.0 | 100.0 | 18.71 | 8.45 | 4.00 | 2.07 | 2.50 | 25.13 | 12.25 | 6.28 | 3.47 | 3.46 | 0.37 | 0.61 | 1.86 | 3.95 @ 50F |
| 1995 | 50.0 | 0.0 | 50.0 | 8.13 | 4.04 | 2.23 | 1.41 | 1.61 | 11.25 | 6.11 | 3.66 | 2.44 | 2.73 | 0.28 | 0.46 | 1.86 | 3.68 @ 75F |
| 1995 | 0.0 | 50.0 | 0.0 | 1.57 | 1.37 | 1.21 | 1.08 | 1.19 | 2.89 | 2.52 | 2.23 | 2.00 | 2.57 | 0.23 | 0.38 | 1.86 | 3.97 @100F |
| 1995 | 50.0 | 50.0 | 50.0 | 10.21 | 4.98 | 2.68 | 1.64 | 1.95 | 14.09 | 7.50 | 4.39 | 2.88 | 3.26 | 0.31 | 0.51 | 1.86 | |
| 1995 | 20.6 | 27.3 | 20.6 | 4.25 | 2.46 | 1.62 | 1.21 | 1.35 | 6.30 | 3.98 | 2.80 | 2.17 | 2.62 | 0.25 | 0.41 | 1.86 | |
| 2000 | 0.0 | 0.0 | 0.0 | 1.41 | 1.21 | 1.06 | 0.94 | 0.94 | 2.38 | 2.01 | 1.72 | 1.50 | 1.64 | 0.23 | 0.38 | 1.74 | 4.29 @ 0F |
| 2000 | 0.0 | 100.0 | 0.0 | 1.61 | 1.41 | 1.25 | 1.12 | 1.25 | 2.65 | 2.32 | 2.04 | 1.81 | 2.19 | 0.27 | 0.44 | 1.74 | 3.87 @ 25F |
| 2000 | 100.0 | 0.0 | 100.0 | 17.98 | 8.01 | 3.73 | 1.90 | 2.38 | 25.19 | 11.49 | 5.48 | 2.83 | 3.28 | 0.38 | 0.64 | 1.74 | 3.53 @ 50F |
| 2000 | 50.0 | 0.0 | 50.0 | 7.80 | 3.82 | 2.08 | 1.30 | 1.49 | 11.10 | 5.62 | 3.14 | 1.99 | 2.26 | 0.29 | 0.48 | 1.74 | 3.26 @ 75F |
| 2000 | 0.0 | 50.0 | 0.0 | 1.47 | 1.27 | 1.12 | 1.00 | 1.05 | 2.45 | 2.10 | 1.82 | 1.60 | 1.83 | 0.24 | 0.40 | 1.74 | 3.52 @100F |
| 2000 | 50.0 | 50.0 | 50.0 | 9.80 | 4.71 | 2.49 | 1.51 | 1.81 | 13.92 | 6.90 | 3.76 | 2.32 | 2.74 | 0.32 | 0.54 | 1.74 | |
| 2000 | 20.6 | 27.3 | 20.6 | 4.05 | 2.31 | 1.51 | 1.12 | 1.22 | 5.98 | 3.53 | 2.36 | 1.76 | 2.00 | 0.26 | 0.43 | 1.74 | |

TABLE 4 : THC AT 35.0 MPH.

# TABLE 5

## LOW ALTITUDE

## THC EMISSION FACTORS (GRAMS/MILE) AT 50.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages | | | LDGV | | | | | LDGT | | | | | -LDDV- | -LDDT- | -HDDV- | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PCCN | PCHC | PCCC | 0°F | 25°F | 50°F | 75°F | 100°F | 0°F | 25°F | 50°F | 75°F | 100°F | 0-100F | 0-100F | 0-100F | |
| 1980 | 0.0 | 0.0 | 0.0 | 3.82 | 3.65 | 3.51 | 3.39 | 3.74 | 6.39 | 6.15 | 5.95 | 5.77 | 6.19 | 0.21 | 0.44 | 2.53 | 12.23 @ 0F |
| 1980 | 0.0 | 100.0 | 0.0 | 3.77 | 3.78 | 3.79 | 3.82 | 4.51 | 6.47 | 6.46 | 6.45 | 6.45 | 7.34 | 0.22 | 0.45 | 2.53 | 11.66 @ 25F |
| 1980 | 100.0 | 0.0 | 100.0 | 17.90 | 11.10 | 7.22 | 5.01 | 4.26 | 27.72 | 17.40 | 11.50 | 8.12 | 6.93 | 0.36 | 0.73 | 2.53 | 11.17 @ 50F |
| 1980 | 50.0 | 0.0 | 50.0 | 9.38 | 6.59 | 4.97 | 4.02 | 3.93 | 14.83 | 10.59 | 8.13 | 6.69 | 6.46 | 0.27 | 0.55 | 2.53 | 10.74 @ 75F |
| 1980 | 0.0 | 50.0 | 0.0 | 3.78 | 3.69 | 3.61 | 3.55 | 4.02 | 6.40 | 6.25 | 6.13 | 6.02 | 6.62 | 0.21 | 0.44 | 2.53 | 11.14 @100F |
| 1980 | 50.0 | 50.0 | 50.0 | 10.83 | 7.44 | 5.51 | 4.41 | 4.39 | 17.10 | 11.93 | 8.98 | 7.29 | 7.13 | 0.29 | 0.59 | 2.53 | |
| 1980 | 20.6 | 27.3 | 20.6 | 6.07 | 4.87 | 4.16 | 3.73 | 3.97 | 9.85 | 8.02 | 6.94 | 6.28 | 6.53 | 0.23 | 0.48 | 2.53 | |
| 1985 | 0.0 | 0.0 | 0.0 | 2.27 | 2.10 | 1.96 | 1.85 | 2.17 | 4.18 | 3.89 | 3.66 | 3.46 | 4.09 | 0.17 | 0.27 | 2.24 | 10.13 @ 0F |
| 1985 | 0.0 | 100.0 | 0.0 | 2.26 | 2.21 | 2.17 | 2.14 | 2.67 | 4.13 | 4.08 | 4.03 | 4.00 | 5.00 | 0.19 | 0.29 | 2.24 | 9.84 @ 25F |
| 1985 | 100.0 | 0.0 | 100.0 | 13.50 | 7.56 | 4.52 | 2.95 | 2.66 | 19.79 | 11.99 | 7.63 | 5.19 | 4.34 | 0.29 | 0.46 | 2.24 | 9.59 @ 50F |
| 1985 | 50.0 | 0.0 | 50.0 | 6.59 | 4.19 | 2.94 | 2.27 | 2.35 | 10.15 | 6.98 | 5.16 | 4.11 | 4.16 | 0.22 | 0.34 | 2.24 | 9.37 @ 75F |
| 1985 | 0.0 | 50.0 | 0.0 | 2.25 | 2.13 | 2.03 | 1.95 | 2.35 | 4.13 | 3.94 | 3.78 | 3.65 | 4.41 | 0.18 | 0.28 | 2.24 | 9.81 @100F |
| 1985 | 50.0 | 50.0 | 50.0 | 7.88 | 4.88 | 3.35 | 2.54 | 2.67 | 11.96 | 8.04 | 5.83 | 4.59 | 4.67 | 0.24 | 0.38 | 2.24 | |
| 1985 | 20.6 | 27.3 | 20.6 | 4.02 | 2.97 | 2.40 | 2.07 | 2.34 | 6.59 | 5.18 | 4.34 | 3.83 | 4.29 | 0.19 | 0.30 | 2.24 | |
| 1988 | 0.0 | 0.0 | 0.0 | 1.74 | 1.58 | 1.45 | 1.34 | 1.57 | 3.30 | 3.01 | 2.78 | 2.59 | 3.21 | 0.17 | 0.27 | 1.88 | 6.61 @ 0F |
| 1988 | 0.0 | 100.0 | 0.0 | 1.79 | 1.70 | 1.62 | 1.56 | 1.94 | 3.34 | 3.22 | 3.13 | 3.05 | 3.99 | 0.19 | 0.29 | 1.88 | 6.31 @ 25F |
| 1988 | 100.0 | 0.0 | 100.0 | 12.84 | 6.62 | 3.67 | 2.25 | 2.21 | 17.68 | 10.24 | 6.25 | 4.09 | 3.43 | 0.29 | 0.44 | 1.88 | 6.06 @ 50F |
| 1988 | 50.0 | 0.0 | 50.0 | 5.99 | 3.50 | 2.29 | 1.68 | 1.81 | 8.70 | 5.72 | 4.07 | 3.14 | 3.27 | 0.21 | 0.33 | 1.88 | 5.86 @ 75F |
| 1988 | 0.0 | 50.0 | 0.0 | 1.74 | 1.61 | 1.50 | 1.42 | 1.70 | 3.29 | 3.07 | 2.89 | 2.75 | 3.48 | 0.18 | 0.27 | 1.88 | 6.18 @100F |
| 1988 | 50.0 | 50.0 | 50.0 | 7.32 | 4.16 | 2.65 | 1.91 | 2.08 | 10.51 | 6.73 | 4.69 | 3.57 | 3.71 | 0.24 | 0.37 | 1.88 | |
| 1988 | 20.6 | 27.3 | 20.6 | 3.48 | 2.38 | 1.82 | 1.52 | 1.74 | 5.49 | 4.14 | 3.37 | 2.90 | 3.38 | 0.19 | 0.30 | 1.88 | |
| 1990 | 0.0 | 0.0 | 0.0 | 1.51 | 1.35 | 1.22 | 1.13 | 1.29 | 2.87 | 2.59 | 2.36 | 2.18 | 2.72 | 0.17 | 0.27 | 1.67 | 5.32 @ 0F |
| 1990 | 0.0 | 100.0 | 0.0 | 1.59 | 1.48 | 1.39 | 1.31 | 1.60 | 2.94 | 2.80 | 2.68 | 2.58 | 3.41 | 0.19 | 0.29 | 1.67 | 5.03 @ 25F |
| 1990 | 100.0 | 0.0 | 100.0 | 12.73 | 6.26 | 3.32 | 1.95 | 2.04 | 17.24 | 9.53 | 5.58 | 3.54 | 3.08 | 0.28 | 0.45 | 1.67 | 4.79 @ 50F |
| 1990 | 50.0 | 0.0 | 50.0 | 5.80 | 3.22 | 2.02 | 1.44 | 1.57 | 8.25 | 5.18 | 3.55 | 2.67 | 2.83 | 0.21 | 0.33 | 1.67 | 4.60 @ 75F |
| 1990 | 0.0 | 50.0 | 0.0 | 1.52 | 1.39 | 1.28 | 1.19 | 1.40 | 2.87 | 2.64 | 2.46 | 2.31 | 2.95 | 0.18 | 0.27 | 1.67 | 4.87 @100F |
| 1990 | 50.0 | 50.0 | 50.0 | 7.16 | 3.87 | 2.35 | 1.63 | 1.82 | 10.09 | 6.16 | 4.13 | 3.06 | 3.24 | 0.24 | 0.37 | 1.67 | |
| 1990 | 20.6 | 27.3 | 20.6 | 3.27 | 2.13 | 1.58 | 1.29 | 1.46 | 5.07 | 3.67 | 2.90 | 2.45 | 2.89 | 0.19 | 0.30 | 1.67 | |
| 1995 | 0.0 | 0.0 | 0.0 | 1.19 | 1.05 | 0.94 | 0.86 | 0.89 | 2.16 | 1.89 | 1.68 | 1.51 | 1.81 | 0.17 | 0.28 | 1.42 | 3.98 @ 0F |
| 1995 | 0.0 | 100.0 | 0.0 | 1.32 | 1.19 | 1.08 | 0.99 | 1.12 | 2.30 | 2.10 | 1.93 | 1.79 | 2.30 | 0.20 | 0.31 | 1.42 | 3.70 @ 25F |
| 1995 | 100.0 | 0.0 | 100.0 | 12.43 | 5.72 | 2.82 | 1.55 | 1.83 | 16.79 | 8.34 | 4.42 | 2.58 | 2.56 | 0.29 | 0.47 | 1.42 | 3.47 @ 50F |
| 1995 | 50.0 | 0.0 | 50.0 | 5.51 | 2.84 | 1.66 | 1.12 | 1.25 | 7.68 | 4.31 | 2.70 | 1.90 | 2.08 | 0.22 | 0.35 | 1.42 | 3.29 @ 75F |
| 1995 | 0.0 | 50.0 | 0.0 | 1.23 | 1.09 | 0.99 | 0.91 | 0.97 | 2.19 | 1.95 | 1.76 | 1.60 | 1.98 | 0.18 | 0.29 | 1.42 | 3.49 @100F |
| 1995 | 50.0 | 50.0 | 50.0 | 6.88 | 3.46 | 1.95 | 1.27 | 1.47 | 9.54 | 5.22 | 3.17 | 2.18 | 2.43 | 0.24 | 0.39 | 1.42 | |
| 1995 | 20.6 | 27.3 | 20.6 | 2.97 | 1.81 | 1.26 | 0.99 | 1.08 | 4.42 | 2.91 | 2.13 | 1.72 | 2.01 | 0.19 | 0.31 | 1.42 | |
| 2000 | 0.0 | 0.0 | 0.0 | 1.10 | 0.97 | 0.87 | 0.79 | 0.79 | 1.80 | 1.56 | 1.37 | 1.22 | 1.32 | 0.18 | 0.29 | 1.34 | 3.61 @ 0F |
| 2000 | 0.0 | 100.0 | 0.0 | 1.23 | 1.10 | 1.00 | 0.91 | 1.00 | 1.98 | 1.76 | 1.58 | 1.43 | 1.68 | 0.20 | 0.33 | 1.34 | 3.32 @ 25F |
| 2000 | 100.0 | 0.0 | 100.0 | 11.92 | 5.41 | 2.62 | 1.42 | 1.74 | 16.70 | 7.75 | 3.82 | 2.10 | 2.39 | 0.29 | 0.49 | 1.34 | 3.09 @ 50F |
| 2000 | 50.0 | 0.0 | 50.0 | 5.27 | 2.68 | 1.54 | 1.03 | 1.15 | 7.49 | 3.91 | 2.30 | 1.55 | 1.72 | 0.22 | 0.37 | 1.34 | 2.91 @ 75F |
| 2000 | 0.0 | 50.0 | 0.0 | 1.14 | 1.01 | 0.91 | 0.83 | 0.87 | 1.85 | 1.62 | 1.44 | 1.29 | 1.44 | 0.19 | 0.31 | 1.34 | 3.09 @100F |
| 2000 | 50.0 | 50.0 | 50.0 | 6.58 | 3.26 | 1.81 | 1.17 | 1.37 | 9.34 | 4.75 | 2.70 | 1.76 | 2.03 | 0.25 | 0.41 | 1.34 | |
| 2000 | 20.6 | 27.3 | 20.6 | 2.83 | 1.69 | 1.17 | 0.91 | 0.98 | 4.15 | 2.55 | 1.78 | 1.39 | 1.55 | 0.20 | 0.33 | 1.34 | |

TABLE 5 : THC AT 50.0 MPH.

## TABLE 6

## LOW ALTITUDE

### THC EMISSION FACTORS (GRAMS/MILE) AT 55.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | LDGV 0°F | LDGV 25°F | LDGV 50°F | LDGV 75°F | LDGV 100°F | LDGT 0°F | LDGT 25°F | LDGT 50°F | LDGT 75°F | LDGT 100°F | -LDDV- 0-100F | -LDDT- 0-100F | -HDDV- 0-100F | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 3.70 | 3.54 | 3.42 | 3.31 | 3.62 | 6.21 | 5.99 | 5.80 | 5.64 | 6.02 | 0.20 | 0.42 | 2.42 | 12.02 @ 0F |
| 1980 | 0.0 | 100.0 | 0.0 | 3.66 | 3.67 | 3.68 | 3.70 | 4.34 | 6.29 | 6.27 | 6.26 | 6.26 | 7.08 | 0.21 | 0.43 | 2.42 | 11.48 @ 25F |
| 1980 | 100.0 | 0.0 | 100.0 | 16.81 | 10.48 | 6.87 | 4.81 | 4.11 | 26.09 | 16.47 | 10.97 | 7.82 | 6.70 | 0.34 | 0.70 | 2.42 | 11.01 @ 50F |
| 1980 | 50.0 | 0.0 | 50.0 | 8.89 | 6.29 | 4.78 | 3.89 | 3.80 | 14.09 | 10.13 | 7.84 | 6.49 | 6.27 | 0.26 | 0.53 | 2.42 | 10.60 @ 75F |
| 1980 | 0.0 | 50.0 | 0.0 | 3.67 | 3.58 | 3.51 | 3.45 | 3.89 | 6.22 | 6.08 | 5.96 | 5.87 | 6.41 | 0.20 | 0.42 | 2.42 | 10.98 @100F |
| 1980 | 50.0 | 50.0 | 50.0 | 10.24 | 7.08 | 5.28 | 4.26 | 4.23 | 16.19 | 11.37 | 8.62 | 7.04 | 6.89 | 0.28 | 0.56 | 2.42 | |
| 1980 | 20.6 | 27.3 | 20.6 | 5.80 | 4.68 | 4.02 | 3.62 | 3.84 | 9.43 | 7.73 | 6.72 | 6.11 | 6.33 | 0.22 | 0.46 | 2.42 | |
| 1985 | 0.0 | 0.0 | 0.0 | 2.17 | 2.02 | 1.89 | 1.80 | 2.08 | 3.99 | 3.73 | 3.52 | 3.35 | 3.91 | 0.16 | 0.26 | 2.14 | 10.01 @ 0F |
| 1985 | 0.0 | 100.0 | 0.0 | 2.17 | 2.12 | 2.08 | 2.05 | 2.54 | 3.96 | 3.91 | 3.87 | 3.83 | 4.74 | 0.19 | 0.28 | 2.14 | 9.74 @ 25F |
| 1985 | 100.0 | 0.0 | 100.0 | 12.41 | 7.00 | 4.23 | 2.80 | 2.53 | 18.31 | 11.16 | 7.17 | 4.93 | 4.15 | 0.28 | 0.44 | 2.14 | 9.50 @ 50F |
| 1985 | 50.0 | 0.0 | 50.0 | 6.11 | 3.93 | 2.79 | 2.17 | 2.24 | 9.48 | 6.57 | 4.91 | 3.94 | 3.98 | 0.21 | 0.33 | 2.14 | 9.29 @ 75F |
| 1985 | 0.0 | 50.0 | 0.0 | 2.15 | 2.04 | 1.95 | 1.89 | 2.24 | 3.95 | 3.78 | 3.64 | 3.52 | 4.20 | 0.17 | 0.27 | 2.14 | 9.70 @100F |
| 1985 | 50.0 | 50.0 | 50.0 | 7.29 | 4.56 | 3.16 | 2.42 | 2.53 | 11.14 | 7.54 | 5.52 | 4.38 | 4.44 | 0.23 | 0.36 | 2.14 | |
| 1985 | 20.6 | 27.3 | 20.6 | 3.77 | 2.81 | 2.29 | 2.00 | 2.23 | 6.21 | 4.92 | 4.15 | 3.68 | 4.10 | 0.18 | 0.29 | 2.14 | |
| 1988 | 0.0 | 0.0 | 0.0 | 1.66 | 1.51 | 1.39 | 1.30 | 1.50 | 3.14 | 2.88 | 2.67 | 2.50 | 3.05 | 0.16 | 0.25 | 1.80 | 6.52 @ 0F |
| 1988 | 0.0 | 100.0 | 0.0 | 1.70 | 1.62 | 1.55 | 1.49 | 1.84 | 3.18 | 3.07 | 2.99 | 2.92 | 3.77 | 0.19 | 0.28 | 1.80 | 6.23 @ 25F |
| 1988 | 100.0 | 0.0 | 100.0 | 11.68 | 6.06 | 3.40 | 2.12 | 2.08 | 16.29 | 9.48 | 5.84 | 3.87 | 3.26 | 0.28 | 0.42 | 1.80 | 5.99 @ 50F |
| 1988 | 50.0 | 0.0 | 50.0 | 5.49 | 3.24 | 2.15 | 1.60 | 1.72 | 8.08 | 5.35 | 3.85 | 3.00 | 3.11 | 0.20 | 0.32 | 1.80 | 5.79 @ 75F |
| 1988 | 0.0 | 50.0 | 0.0 | 1.66 | 1.54 | 1.44 | 1.36 | 1.62 | 3.13 | 2.93 | 2.77 | 2.64 | 3.30 | 0.17 | 0.26 | 1.80 | 6.10 @100F |
| 1988 | 50.0 | 50.0 | 50.0 | 6.69 | 3.84 | 2.48 | 1.81 | 1.96 | 9.73 | 6.28 | 4.41 | 3.39 | 3.51 | 0.23 | 0.35 | 1.80 | |
| 1988 | 20.6 | 27.3 | 20.6 | 3.22 | 2.23 | 1.73 | 1.46 | 1.65 | 5.15 | 3.91 | 3.20 | 2.78 | 3.21 | 0.18 | 0.28 | 1.80 | |
| 1990 | 0.0 | 0.0 | 0.0 | 1.43 | 1.29 | 1.17 | 1.09 | 1.23 | 2.72 | 2.46 | 2.26 | 2.09 | 2.58 | 0.16 | 0.26 | 1.60 | 5.23 @ 0F |
| 1990 | 0.0 | 100.0 | 0.0 | 1.50 | 1.40 | 1.32 | 1.25 | 1.51 | 2.79 | 2.66 | 2.55 | 2.46 | 3.21 | 0.19 | 0.28 | 1.60 | 4.96 @ 25F |
| 1990 | 100.0 | 0.0 | 100.0 | 11.54 | 5.72 | 3.06 | 1.83 | 1.91 | 15.80 | 8.78 | 5.19 | 3.33 | 2.91 | 0.27 | 0.43 | 1.60 | 4.74 @ 50F |
| 1990 | 50.0 | 0.0 | 50.0 | 5.30 | 2.98 | 1.89 | 1.37 | 1.49 | 7.62 | 4.82 | 3.34 | 2.54 | 2.69 | 0.20 | 0.32 | 1.60 | 4.55 @ 75F |
| 1990 | 0.0 | 50.0 | 0.0 | 1.44 | 1.32 | 1.22 | 1.14 | 1.33 | 2.72 | 2.52 | 2.35 | 2.22 | 2.79 | 0.17 | 0.26 | 1.60 | 4.81 @100F |
| 1990 | 50.0 | 50.0 | 50.0 | 6.52 | 3.56 | 2.19 | 1.54 | 1.71 | 9.30 | 5.72 | 3.87 | 2.90 | 3.06 | 0.23 | 0.35 | 1.60 | |
| 1990 | 20.6 | 27.3 | 20.6 | 3.02 | 1.99 | 1.49 | 1.23 | 1.39 | 4.72 | 3.45 | 2.75 | 2.34 | 2.74 | 0.18 | 0.28 | 1.60 | |
| 1995 | 0.0 | 0.0 | 0.0 | 1.13 | 1.00 | 0.91 | 0.83 | 0.86 | 2.03 | 1.79 | 1.60 | 1.45 | 1.72 | 0.17 | 0.27 | 1.36 | 3.91 @ 0F |
| 1995 | 0.0 | 100.0 | 0.0 | 1.24 | 1.12 | 1.03 | 0.95 | 1.06 | 2.16 | 1.98 | 1.83 | 1.70 | 2.16 | 0.19 | 0.30 | 1.36 | 3.64 @ 25F |
| 1995 | 100.0 | 0.0 | 100.0 | 11.22 | 5.20 | 2.59 | 1.45 | 1.70 | 15.26 | 7.62 | 4.08 | 2.41 | 2.40 | 0.27 | 0.45 | 1.36 | 3.43 @ 50F |
| 1995 | 50.0 | 0.0 | 50.0 | 5.01 | 2.61 | 1.55 | 1.06 | 1.18 | 7.02 | 3.97 | 2.52 | 1.80 | 1.96 | 0.21 | 0.34 | 1.36 | 3.25 @ 75F |
| 1995 | 0.0 | 50.0 | 0.0 | 1.16 | 1.04 | 0.95 | 0.87 | 0.93 | 2.06 | 1.84 | 1.67 | 1.53 | 1.87 | 0.17 | 0.28 | 1.36 | 3.44 @100F |
| 1995 | 50.0 | 50.0 | 50.0 | 6.23 | 3.16 | 1.81 | 1.20 | 1.38 | 8.71 | 4.80 | 2.95 | 2.06 | 2.28 | 0.23 | 0.38 | 1.36 | |
| 1995 | 20.6 | 27.3 | 20.6 | 2.73 | 1.68 | 1.19 | 0.95 | 1.03 | 4.08 | 2.71 | 2.01 | 1.64 | 1.90 | 0.19 | 0.30 | 1.36 | |
| 2000 | 0.0 | 0.0 | 0.0 | 1.04 | 0.93 | 0.84 | 0.77 | 0.77 | 1.69 | 1.47 | 1.30 | 1.17 | 1.26 | 0.17 | 0.28 | 1.28 | 3.54 @ 0F |
| 2000 | 0.0 | 100.0 | 0.0 | 1.16 | 1.04 | 0.95 | 0.87 | 0.95 | 1.85 | 1.65 | 1.49 | 1.36 | 1.58 | 0.20 | 0.32 | 1.28 | 3.27 @ 25F |
| 2000 | 100.0 | 0.0 | 100.0 | 10.74 | 4.91 | 2.40 | 1.33 | 1.61 | 15.11 | 7.05 | 3.52 | 1.96 | 2.22 | 0.28 | 0.47 | 1.28 | 3.05 @ 50F |
| 2000 | 50.0 | 0.0 | 50.0 | 4.78 | 2.46 | 1.44 | 0.98 | 1.09 | 6.82 | 3.59 | 2.14 | 1.46 | 1.62 | 0.21 | 0.35 | 1.28 | 2.88 @ 75F |
| 2000 | 0.0 | 50.0 | 0.0 | 1.08 | 0.96 | 0.87 | 0.80 | 0.83 | 1.73 | 1.53 | 1.36 | 1.23 | 1.37 | 0.18 | 0.29 | 1.28 | 3.05 @100F |
| 2000 | 50.0 | 50.0 | 50.0 | 5.95 | 2.98 | 1.68 | 1.10 | 1.28 | 8.48 | 4.35 | 2.50 | 1.66 | 1.90 | 0.24 | 0.40 | 1.28 | |
| 2000 | 20.6 | 27.3 | 20.6 | 2.59 | 1.57 | 1.10 | 0.87 | 0.93 | 3.81 | 2.37 | 1.68 | 1.32 | 1.47 | 0.19 | 0.32 | 1.28 | |

TABLE 6 : THC AT 55.0 MPH.

## TABLE 7

## LOW ALTITUDE

## CO EMISSION FACTORS (GRAMS/MILE) AT 5.0 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | LDGV | | | | | LDGT | | | | | -LDDV- | -LDDT- | -HDDV- | HDGV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0°F | 25°F | 50°F | 75°F | 100°F | 0°F | 25°F | 50°F | 75°F | 100°F | 0-100F | 0-100F | 0-100F | |
| 1980 | 0.0 | 0.0 | 0.0 | 181.00 | 162.21 | 146.89 | 134.39 | 275.49 | 272.66 | 245.22 | 222.46 | 203.59 | 372.06 | 2.60 | 4.29 | 39.13 | 650.51 @ 0F |
| 1980 | 0.0 | 100.0 | 0.0 | 127.37 | 132.51 | 138.51 | 145.45 | 277.90 | 198.40 | 205.54 | 213.36 | 221.94 | 413.96 | 4.41 | 7.45 | 39.13 | 592.94 @ 25F |
| 1980 | 100.0 | 0.0 | 100.0 | 1530.38 | 896.75 | 528.12 | 311.85 | 192.81 | 2171.84 | 1284.37 | 764.49 | 458.24 | 267.92 | 5.44 | 9.13 | 39.13 | 540.94 @ 50F |
| 1980 | 50.0 | 0.0 | 50.0 | 693.77 | 440.91 | 291.01 | 200.85 | 239.73 | 998.59 | 641.96 | 428.83 | 299.83 | 327.49 | 3.65 | 6.07 | 39.13 | 493.95 @ 75F |
| 1980 | 0.0 | 50.0 | 0.0 | 158.20 | 148.93 | 142.06 | 137.23 | 272.42 | 241.59 | 227.83 | 217.13 | 209.04 | 383.53 | 3.26 | 5.44 | 39.13 | 842.23 @100F |
| 1980 | 50.0 | 50.0 | 50.0 | 828.88 | 514.63 | 333.32 | 228.65 | 235.35 | 1185.12 | 744.95 | 488.93 | 340.09 | 340.94 | 4.92 | 8.29 | 39.13 | |
| 1980 | 20.6 | 27.3 | 20.6 | 377.91 | 268.73 | 203.05 | 163.01 | 259.07 | 552.11 | 397.70 | 303.76 | 245.77 | 359.89 | 3.38 | 5.64 | 39.13 | |
| 1985 | 0.0 | 0.0 | 0.0 | 118.18 | 96.82 | 80.98 | 69.05 | 167.66 | 215.93 | 183.33 | 157.20 | 136.14 | 313.98 | 2.70 | 3.12 | 33.24 | 522.62 @ 0F |
| 1985 | 0.0 | 100.0 | 0.0 | 83.12 | 79.14 | 76.94 | 76.23 | 150.22 | 144.29 | 144.55 | 145.65 | 147.54 | 297.60 | 4.22 | 5.45 | 33.24 | 476.98 @ 25F |
| 1985 | 100.0 | 0.0 | 100.0 | 394.95 | 582.50 | 331.42 | 168.64 | 107.75 | 1737.99 | 993.92 | 568.23 | 321.09 | 189.17 | 5.52 | 6.67 | 33.24 | 436.99 @ 50F |
| 1985 | 50.0 | 0.0 | 50.0 | 447.46 | 278.79 | 174.33 | 105.53 | 141.42 | 778.35 | 482.24 | 308.02 | 203.10 | 261.48 | 3.74 | 4.43 | 33.24 | 401.80 @ 75F |
| 1985 | 0.0 | 50.0 | 0.0 | 102.36 | 88.15 | 77.90 | 70.54 | 157.50 | 185.37 | 165.76 | 150.37 | 138.34 | 302.14 | 3.25 | 3.97 | 33.24 | 708.37 @100F |
| 1985 | 50.0 | 50.0 | 50.0 | 539.03 | 330.82 | 204.18 | 122.43 | 128.98 | 941.14 | 569.23 | 356.94 | 234.32 | 243.38 | 4.87 | 6.06 | 33.24 | |
| 1985 | 20.6 | 27.3 | 20.6 | 243.96 | 166.35 | 117.37 | 84.70 | 151.31 | 428.70 | 295.66 | 214.94 | 164.56 | 285.91 | 3.42 | 4.11 | 33.24 | |
| 1988 | 0.0 | 0.0 | 0.0 | 97.19 | 72.83 | 56.01 | 44.21 | 109.49 | 181.07 | 146.32 | 119.97 | 99.72 | 251.76 | 2.72 | 3.03 | 30.32 | 346.72 @ 0F |
| 1988 | 0.0 | 100.0 | 0.0 | 73.75 | 64.04 | 57.08 | 52.24 | 97.92 | 123.06 | 117.12 | 113.06 | 110.52 | 228.87 | 4.24 | 5.31 | 30.32 | 312.41 @ 25F |
| 1988 | 100.0 | 0.0 | 100.0 | 768.54 | 452.35 | 254.27 | 117.05 | 76.74 | 1426.99 | 817.47 | 462.91 | 248.33 | 147.93 | 5.62 | 6.50 | 30.32 | 282.57 @ 50F |
| 1988 | 50.0 | 0.0 | 50.0 | 348.[illegible]2 | 214.41 | 129.62 | 70.70 | 94.50 | 638.54 | 392.25 | 245.00 | 153.04 | 207.93 | 3.79 | 4.31 | 30.32 | 256.52 @ 75F |
| 1988 | 0.0 | 50.0 | 0.0 | 85.84 | 67.70 | 55.08 | 46.24 | 102.41 | 155.69 | 132.50 | 115.07 | 101.88 | 237.95 | 3.27 | 3.86 | 30.32 | 427.03 @100F |
| 1988 | 50.0 | 50.0 | 50.0 | 421.15 | 258.20 | 155.68 | 84.64 | 87.33 | 775.03 | 467.29 | 287.99 | 179.43 | 188.40 | 4.93 | 5.90 | 30.32 | |
| 1988 | 20.6 | 27.3 | 20.6 | 193.40 | 127.79 | 85.51 | 56.08 | 99.44 | 353.82 | 239.06 | 168.24 | 122.57 | 226.19 | 3.45 | 4.00 | 30.32 | |
| 1990 | 0.0 | 0.0 | 0.0 | 88.36 | 62.24 | 44.86 | 33.15 | 78.77 | 162.75 | 126.22 | 99.65 | 79.99 | 207.77 | 2.72 | 3.02 | 28.96 | 260.28 @ 0F |
| 1990 | 0.0 | 100.0 | 0.0 | 70.58 | 57.86 | 48.48 | 41.62 | 72.70 | 113.56 | 103.40 | 95.99 | 90.69 | 185.73 | 4.24 | 5.30 | 28.96 | 232.44 @ 25F |
| 1990 | 100.0 | 0.0 | 100.0 | 651.94 | 387.47 | 217.60 | 94.04 | 63.60 | 1251.16 | 712.57 | 399.45 | 205.90 | 125.87 | 5.65 | 6.49 | 28.96 | 208.28 @ 50F |
| 1990 | 50.0 | 0.0 | 50.0 | 298.71 | 183.49 | 109.01 | 55.28 | 71.08 | 561.90 | 340.80 | 208.80 | 125.00 | 172.84 | 3.80 | 4.30 | 28.96 | 187.28 @ 75F |
| 1990 | 0.0 | 50.0 | 0.0 | 79.23 | 58.92 | 45.05 | 35.49 | 74.41 | 140.69 | 114.90 | 96.12 | 82.27 | 194.89 | 3.27 | 3.85 | 28.96 | 303.44 @100F |
| 1990 | 50.0 | 50.0 | 50.0 | 361.26 | 222.67 | 133.04 | 67.83 | 68.15 | 682.36 | 407.99 | 247.72 | 148.29 | 155.80 | 4.94 | 5.89 | 28.96 | |
| 1990 | 20.6 | 27.3 | 20.6 | 169.21 | 109.88 | 71.11 | 43.42 | 73.19 | 313.51 | 207.54 | 142.19 | 99.52 | 186.36 | 3.45 | 3.99 | 28.96 | |
| 1995 | 0.0 | 0.0 | 0.0 | 77.37 | 49.31 | 31.58 | 20.35 | 34.87 | 130.83 | 90.42 | 63.53 | 45.42 | 112.15 | 2.74 | 3.07 | 27.20 | 155.54 @ 0F |
| 1995 | 0.0 | 100.0 | 0.0 | 67.04 | 50.54 | 38.28 | 29.15 | 40.57 | 101.02 | 82.09 | 67.89 | 57.21 | 104.09 | 4.29 | 5.42 | 27.20 | 136.46 @ 25F |
| 1995 | 100.0 | 0.0 | 100.0 | 493.19 | 302.40 | 171.68 | 66.66 | 47.70 | 939.92 | 523.50 | 285.45 | 131.40 | 86.32 | 5.79 | 6.62 | 27.20 | 119.98 @ 50F |
| 1995 | 50.0 | 0.0 | 50.0 | 233.09 | 144.07 | 83.93 | 37.35 | 38.81 | 428.75 | 249.54 | 144.71 | 76.23 | 100.02 | 3.86 | 4.38 | 27.20 | 105.73 @ 75F |
| 1995 | 0.0 | 50.0 | 0.0 | 71.25 | 48.38 | 33.23 | 23.11 | 36.05 | 116.18 | 84.93 | 63.49 | 48.62 | 106.32 | 3.30 | 3.93 | 27.20 | 151.86 @100F |
| 1995 | 50.0 | 50.0 | 50.0 | 280.12 | 176.47 | 104.98 | 47.91 | 44.13 | 520.47 | 302.80 | 176.67 | 94.30 | 95.20 | 5.04 | 6.02 | 27.20 | |
| 1995 | 20.6 | 27.3 | 20.6 | 137.56 | 87.45 | 53.81 | 28.76 | 37.08 | 244.34 | 152.29 | 96.58 | 59.67 | 103.93 | 3.50 | 4.07 | 27.20 | |
| 2000 | 0.0 | 0.0 | 0.0 | 74.03 | 46.25 | 28.90 | 18.06 | 25.53 | 115.58 | 73.48 | 46.90 | 30.07 | 54.49 | 2.78 | 3.13 | 26.28 | 120.35 @ 0F |
| 2000 | 0.0 | 100.0 | 0.0 | 64.76 | 48.03 | 35.63 | 26.43 | 33.67 | 95.43 | 71.98 | 54.52 | 41.50 | 60.43 | 4.36 | 5.54 | 26.28 | 104.53 @ 25F |
| 2000 | 100.0 | 0.0 | 100.0 | 451.80 | 281.60 | 161.00 | 60.56 | 44.20 | 785.67 | 428.91 | 229.06 | 95.40 | 67.26 | 5.92 | 6.76 | 26.28 | 90.90 @ 50F |
| 2000 | 50.0 | 0.0 | 50.0 | 215.90 | 134.63 | 78.42 | 33.74 | 31.92 | 365.88 | 205.94 | 114.54 | 53.91 | 58.02 | 3.93 | 4.47 | 26.28 | 79.17 @ 75F |
| 2000 | 0.0 | 50.0 | 0.0 | 68.40 | 45.62 | 30.64 | 20.73 | 27.91 | 104.69 | 70.85 | 48.47 | 33.55 | 55.28 | 3.35 | 4.01 | 26.28 | 101.70 @100F |
| 2000 | 50.0 | 50.0 | 50.0 | 258.28 | 164.82 | 98.31 | 43.49 | 38.94 | 440.55 | 250.45 | 141.79 | 68.45 | 63.84 | 5.14 | 6.15 | 26.28 | |
| 2000 | 20.6 | 27.3 | 20.6 | 128.83 | 81.95 | 50.03 | 25.89 | 29.40 | 211.75 | 126.06 | 75.31 | 41.65 | 56.30 | 3.56 | 4.15 | 26.28 | |

TABLE 7 : CO AT 5.0 MPH.

## TABLE 8

## LOW ALTITUDE

## CO EMISSION FACTORS (GRAMS/MILE) AT 10.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | LDGV 0°F | LDGV 25°F | LDGV 50°F | LDGV 75°F | LDGV 100°F | LDGT 0°F | LDGT 25°F | LDGT 50°F | LDGT 75°F | LDGT 100°F | -LDDV- 0-100F | -LDDT- 0-100F | -HDDV- 0-100F | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 95.21 | 84.61 | 76.03 | 69.06 | 146.06 | 136.93 | 122.81 | 111.15 | 101.53 | 189.08 | 1.79 | 2.96 | 26.98 | 432.79 @ 0F |
| 1980 | 0.0 | 100.0 | 0.0 | 67.32 | 69.55 | 72.21 | 75.33 | 144.69 | 100.02 | 103.32 | 106.94 | 110.93 | 206.73 | 3.04 | 5.13 | 26.98 | 394.49 @ 25F |
| 1980 | 100.0 | 0.0 | 100.0 | 817.22 | 475.91 | 278.43 | 163.01 | 100.74 | 1100.24 | 648.38 | 384.79 | 230.10 | 135.27 | 3.75 | 6.29 | 26.98 | 359.89 @ 50F |
| 1980 | 50.0 | 0.0 | 50.0 | 367.92 | 232.20 | 152.08 | 104.01 | 126.46 | 504.23 | 322.99 | 215.08 | 149.98 | 165.97 | 2.51 | 4.19 | 26.98 | 328.63 @ 75F |
| 1980 | 0.0 | 50.0 | 0.0 | 83.25 | 77.76 | 73.63 | 70.65 | 143.28 | 121.38 | 114.16 | 108.54 | 104.28 | 193.39 | 2.25 | 3.75 | 26.98 | 560.35 @100F |
| 1980 | 50.0 | 50.0 | 50.0 | 442.27 | 272.73 | 175.32 | 119.17 | 122.72 | 600.13 | 375.85 | 245.87 | 170.51 | 171.00 | 3.39 | 5.71 | 26.98 | |
| 1980 | 20.6 | 27.3 | 20.6 | 200.01 | 141.11 | 105.74 | 84.16 | 136.46 | 278.41 | 199.81 | 152.13 | 122.77 | 181.88 | 2.33 | 3.89 | 26.98 | |
| 1985 | 0.0 | 0.0 | 0.0 | 70.98 | 56.64 | 46.22 | 38.53 | 96.12 | 123.44 | 103.34 | 87.43 | 74.75 | 182.61 | 1.86 | 2.15 | 22.92 | 347.71 @ 0F |
| 1985 | 0.0 | 100.0 | 0.0 | 51.88 | 48.01 | 45.46 | 43.96 | 86.16 | 83.68 | 82.82 | 82.52 | 82.71 | 168.66 | 2.91 | 3.76 | 22.92 | 317.34 @ 25F |
| 1985 | 100.0 | 0.0 | 100.0 | 613.42 | 360.32 | 203.62 | 98.87 | 63.36 | 1022.36 | 580.88 | 329.32 | 183.32 | 108.84 | 3.81 | 4.60 | 22.92 | 290.73 @ 50F |
| 1985 | 50.0 | 0.0 | 50.0 | 273.51 | 169.84 | 104.63 | 60.50 | 81.69 | 452.37 | 277.74 | 175.32 | 113.63 | 151.59 | 2.58 | 3.05 | 22.92 | 267.32 @ 75F |
| 1985 | 0.0 | 50.0 | 0.0 | 62.16 | 52.15 | 44.97 | 39.82 | 90.23 | 106.30 | 93.79 | 84.03 | 76.41 | 173.84 | 2.24 | 2.74 | 22.92 | 471.29 @100F |
| 1985 | 50.0 | 50.0 | 50.0 | 332.65 | 204.17 | 124.54 | 71.42 | 74.76 | 553.02 | 331.85 | .05.92 | 133.01 | 138.75 | 3.36 | 4.18 | 22.92 | |
| 1985 | 20.6 | 27.3 | 20.6 | 148.82 | 100.38 | 69.35 | 48.17 | 86.96 | 248.24 | 169.24 | 121.38 | 91.45 | 165.06 | 2.36 | 2.83 | 22.92 | |
| 1988 | 0.0 | 0.0 | 0.0 | 65.62 | 47.73 | 35.60 | 27.24 | 67.24 | 112.09 | 88.64 | 71.20 | 58.04 | 155.09 | 1.87 | 2.09 | 20.91 | 230.68 @ 0F |
| 1988 | 0.0 | 100.0 | 0.0 | 51.73 | 43.69 | 37.81 | 33.57 | 61.43 | 78.41 | 73.07 | 69.15 | 66.37 | 138.55 | 2.92 | 3.66 | 20.91 | 207.85 @ 25F |
| 1988 | 100.0 | 0.0 | 100.0 | 522.46 | 309.39 | 173.42 | 76.35 | 50.49 | 902.75 | 516.35 | 290.78 | 152.52 | 91.73 | 3.88 | 4.48 | 20.91 | 187.99 @ 50F |
| 1988 | 50.0 | 0.0 | 50.0 | 235.70 | 145.05 | 86.66 | 45.05 | 59.35 | 400.25 | 244.29 | 150.74 | 91.69 | 128.30 | 2.61 | 2.97 | 20.91 | 170.67 @ 75F |
| 1988 | 0.0 | 50.0 | 0.0 | 58.66 | 44.99 | 35.54 | 28.96 | 63.36 | 97.09 | 80.93 | 68.92 | 59.91 | 145.50 | 2.25 | 2.66 | 20.91 | 284.11 @100F |
| 1988 | 50.0 | 50.0 | 50.0 | 287.09 | 176.54 | 105.62 | 54.96 | 55.96 | 490.58 | 294.71 | 179.96 | 109.45 | 115.14 | 3.40 | 4.07 | 20.91 | |
| 1988 | 20.6 | 27.3 | 20.6 | 131.22 | 85.93 | 56.38 | 35.42 | 61.85 | 221.41 | 147.88 | 102.35 | 72.73 | 138.83 | 2.38 | 2.76 | 20.91 | |
| 1990 | 0.0 | 0.0 | 0.0 | 63.95 | 44.04 | 30.94 | 22.23 | 51.38 | 106.69 | 80.79 | 62.31 | 48.90 | 132.51 | 1.87 | 2.08 | 19.97 | 173.17 @ 0F |
| 1990 | 0.0 | 100.0 | 0.0 | 52.56 | 42.27 | 34.64 | 29.01 | 49.14 | 77.05 | 68.55 | 62.20 | 57.50 | 117.65 | 2.92 | 3.66 | 19.97 | 154.64 @ 25F |
| 1990 | 100.0 | 0.0 | 100.0 | 471.85 | 282.14 | 158.39 | 66.26 | 45.14 | 834.77 | 474.96 | 264.97 | 133.26 | 82.28 | 3.90 | 4.47 | 19.97 | 138.57 @ 50F |
| 1990 | 50.0 | 0.0 | 50.0 | 215.82 | 132.65 | 78.22 | 38.22 | 47.79 | 372.31 | 224.37 | 135.79 | 78.91 | 110.99 | 2.62 | 2.96 | 19.97 | 124.60 @ 75F |
| 1990 | 0.0 | 50.0 | 0.0 | 57.90 | 42.18 | 31.51 | 24.19 | 49.19 | 93.10 | 74.33 | 60.81 | 50.95 | 123.88 | 2.25 | 2.66 | 19.97 | 201.88 @100F |
| 1990 | 50.0 | 50.0 | 50.0 | 262.21 | 162.21 | 96.52 | 47.63 | 47.14 | 455.91 | 271.75 | 163.58 | 95.38 | 99.97 | 3.41 | 4.06 | 19.97 | |
| 1990 | 20.6 | 27.3 | 20.6 | 122.61 | 79.16 | 50.52 | 29.80 | 48.67 | 207.59 | 135.79 | 91.42 | 62.21 | 118.94 | 2.38 | 2.75 | 19.97 | |
| 1995 | 0.0 | 0.0 | 0.0 | 61.30 | 38.92 | 24.82 | 15.90 | 26.53 | 97.95 | 66.73 | 46.14 | 32.42 | 79.67 | 1.89 | 2.12 | 18.76 | 103.48 @ 0F |
| 1995 | 0.0 | 100.0 | 0.0 | 53.34 | 40.10 | 30.27 | 22.95 | 31.56 | 77.07 | 61.88 | 50.47 | 41.88 | 74.97 | 2.96 | 3.74 | 18.76 | 90.79 @ 25F |
| 1995 | 100.0 | 0.0 | 100.0 | 390.09 | 239.64 | 136.15 | 52.60 | 37.73 | 707.39 | 393.88 | 214.37 | 97.18 | 64.30 | 3.99 | 4.57 | 18.76 | 79.82 @ 50F |
| 1995 | 50.0 | 0.0 | 50.0 | 184.40 | 114.07 | 66.42 | 29.38 | 30.09 | 322.24 | 186.90 | 107.69 | 55.64 | 72.19 | 2.66 | 3.02 | 18.76 | 70.35 @ 75F |
| 1995 | 0.0 | 50.0 | 0.0 | 56.54 | 38.27 | 26.18 | 18.13 | 27.70 | 87.49 | 63.13 | 46.52 | 35.07 | 75.89 | 2.28 | 2.71 | 18.76 | 101.04 @100F |
| 1995 | 50.0 | 50.0 | 50.0 | 221.71 | 139.87 | 83.21 | 37.78 | 34.65 | 392.23 | 227.88 | 132.42 | 69.53 | 69.63 | 3.47 | 4.15 | 18.76 | |
| 1995 | 20.6 | 27.3 | 20.6 | 108.92 | 69.21 | 42.52 | 22.59 | 28.59 | 183.71 | 113.75 | 71.42 | 43.29 | 74.49 | 2.41 | 2.80 | 18.76 | |
| 2000 | 0.0 | 0.0 | 0.0 | 59.47 | 37.16 | 23.21 | 14.50 | 20.51 | 92.44 | 58.71 | 37.42 | 23.96 | 43.10 | 1.91 | 2.16 | 18.12 | 80.07 @ 0F |
| 2000 | 0.0 | 100.0 | 0.0 | 52.02 | 38.59 | 28.62 | 21.23 | 27.05 | 76.36 | 57.54 | 43.53 | 33.08 | 47.98 | 3.01 | 3.82 | 18.12 | 69.54 @ 25F |
| 2000 | 100.0 | 0.0 | 100.0 | 362.95 | 226.22 | 129.33 | 48.65 | 35.51 | 627.65 | 342.66 | 182.98 | 76.09 | 53.69 | 4.08 | 4.66 | 18.12 | 60.48 @ 50F |
| 2000 | 50.0 | 0.0 | 50.0 | 173.44 | 108.15 | 63.00 | 27.10 | 25.64 | 292.45 | 164.57 | 91.50 | 42.99 | 46.07 | 2.71 | 3.08 | 18.12 | 52.67 @ 75F |
| 2000 | 0.0 | 50.0 | 0.0 | 54.94 | 36.65 | 24.62 | 16.66 | 22.42 | 83.74 | 56.62 | 38.68 | 26.73 | 43.79 | 2.31 | 2.77 | 18.12 | 67.67 @100F |
| 2000 | 50.0 | 50.0 | 50.0 | 207.49 | 132.40 | 78.98 | 34.94 | 31.28 | 352.01 | 200.10 | 113.25 | 54.59 | 50.84 | 3.55 | 4.24 | 18.12 | |
| 2000 | 20.6 | 27.3 | 20.6 | 103.50 | 65.83 | 40.19 | 20.80 | 23.62 | 169.29 | 100.74 | 60.14 | 33.20 | 44.64 | 2.45 | 2.86 | 18.12 | |

TABLE 8 : CO AT 10.0 MPH.

TABLE 9

LOW ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE) AT 19.6 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | LDGV | | | | | LDGT | | | | | -LDDV- | -LDDT- | -HDDV- | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0°F | 25°F | 50°F | 75°F | 100°F | 0°F | 25°F | 50°F | 75°F | 100°F | 0-100F | 0-100F | 0-100F | |
| 1980 | 0.0 | 0.0 | 0.0 | 52.62 | 46.49 | 41.54 | 37.55 | 81.42 | 74.07 | 66.20 | 59.73 | 54.43 | 103.77 | 1.00 | 1.65 | 15.01 | 230.91 @ 0F |
| 1980 | 0.0 | 100.0 | 0.0 | 37.13 | 38.17 | 39.44 | 40.96 | 78.82 | 53.99 | 55.61 | 57.40 | 59.37 | 110.47 | 1.69 | 2.86 | 15.01 | 210.48 @ 25F |
| 1980 | 100.0 | 0.0 | 100.0 | 450.61 | 261.41 | 152.33 | 88.76 | 54.96 | 593.45 | 348.68 | 206.43 | 123.22 | 73.08 | 2.09 | 3.50 | 15.01 | 192.02 @ 50F |
| 1980 | 50.0 | 0.0 | 50.0 | 203.07 | 127.60 | 83.18 | 56.58 | 69.92 | 272.38 | 173.92 | 115.50 | 80.36 | 90.49 | 1.40 | 2.33 | 15.01 | 175.34 @ 75F |
| 1980 | 0.0 | 50.0 | 0.0 | 45.91 | 42.65 | 40.18 | 38.37 | 79.07 | 65.52 | 61.43 | 58.25 | 55.82 | 104.87 | 1.25 | 2.09 | 15.01 | 298.97 @100F |
| 1980 | 50.0 | 50.0 | 50.0 | 243.87 | 149.79 | 95.89 | 64.86 | 66.89 | 323.72 | 202.14 | 131.91 | 91.30 | 91.77 | 1.89 | 3.18 | 15.01 | |
| 1980 | 20.6 | 27.3 | 20.6 | 110.38 | 77.50 | 57.78 | 45.75 | 75.40 | 150.38 | 107.58 | 81.67 | 65.75 | 98.88 | 1.30 | 2.16 | 15.01 | |
| 1985 | 0.0 | 0.0 | 0.0 | 41.84 | 32.96 | 26.56 | 21.87 | 55.58 | 68.96 | 57.34 | 48.20 | 40.96 | 102.76 | 1.04 | 1.20 | 12.75 | 185.52 @ 0F |
| 1985 | 0.0 | 100.0 | 0.0 | 30.92 | 28.23 | 26.39 | 25.20 | 49.25 | 46.77 | 46.01 | 45.59 | 45.47 | 93.04 | 1.62 | 2.09 | 12.75 | 169.32 @ 25F |
| 1985 | 100.0 | 0.0 | 100.0 | 362.91 | 213.46 | 120.23 | 57.05 | 36.65 | 571.10 | 323.92 | 183.13 | 101.26 | 60.46 | 2.12 | 2.56 | 12.75 | 155.12 @ 50F |
| 1985 | 50.0 | 0.0 | 50.0 | 161.88 | 100.33 | 61.35 | 34.68 | 47.16 | 252.74 | 154.70 | 97.21 | 62.53 | 84.89 | 1.43 | 1.70 | 12.75 | 142.63 @ 75F |
| 1985 | 0.0 | 50.0 | 0.0 | 36.72 | 30.42 | 25.91 | 22.67 | 51.89 | 59.31 | 52.00 | 46.31 | 41.88 | 97.01 | 1.25 | 1.52 | 12.75 | 251.45 @100F |
| 1985 | 50.0 | 50.0 | 50.0 | 196.91 | 120.85 | 73.31 | 41.13 | 42.95 | 308.93 | 184.97 | 114.36 | 73.36 | 76.75 | 1.87 | 2.33 | 12.75 | |
| 1985 | 20.6 | 27.3 | 20.6 | 88.03 | 59.06 | 40.39 | 27.52 | 50.09 | 138.65 | 94.12 | 67.14 | 50.23 | 92.27 | 1.31 | 1.58 | 12.75 | |
| 1988 | 0.0 | 0.0 | 0.0 | 40.54 | 29.13 | 21.44 | 16.17 | 39.98 | 64.76 | 50.66 | 40.27 | 32.50 | 88.99 | 1.04 | 1.16 | 11.63 | 123.07 @ 0F |
| 1988 | 0.0 | 100.0 | 0.0 | 32.28 | 26.96 | 23.04 | 20.18 | 36.51 | 45.64 | 42.07 | 39.40 | 37.46 | 78.40 | 1.63 | 2.04 | 11.63 | 110.90 @ 25F |
| 1988 | 100.0 | 0.0 | 100.0 | 321.70 | 191.00 | 106.93 | 46.16 | 30.67 | 520.84 | 298.21 | 167.70 | 86.95 | 52.59 | 2.16 | 2.49 | 11.63 | 100.30 @ 50F |
| 1988 | 50.0 | 0.0 | 50.0 | 145.39 | 89.43 | 53.16 | 27.06 | 35.48 | 231.15 | 140.83 | 86.47 | 51.90 | 73.51 | 1.45 | 1.65 | 11.63 | 91.06 @ 75F |
| 1988 | 0.0 | 50.0 | 0.0 | 36.33 | 27.55 | 21.49 | 17.28 | 37.63 | 56.15 | 46.31 | 39.05 | 33.62 | 82.99 | 1.25 | 1.48 | 11.63 | 151.58 @100F |
| 1988 | 50.0 | 50.0 | 50.0 | 176.99 | 108.98 | 64.99 | 33.17 | 33.59 | 283.24 | 170.14 | 103.55 | 62.21 | 65.50 | 1.89 | 2.26 | 11.63 | |
| 1988 | 20.6 | 27.3 | 20.6 | 81.03 | 52.86 | 34.40 | 21.20 | 36.83 | 127.92 | 85.05 | 58.42 | 40.99 | 79.34 | 1.32 | 1.53 | 11.63 | |
| 1990 | 0.0 | 0.0 | 0.0 | 40.48 | 27.64 | 19.22 | 13.66 | 31.20 | 63.32 | 47.38 | 36.11 | 28.01 | 77.04 | 1.04 | 1.16 | 11.11 | 92.39 @ 0F |
| 1990 | 0.0 | 100.0 | 0.0 | 33.52 | 26.76 | 21.73 | 18.01 | 30.08 | 46.22 | 40.63 | 36.42 | 33.28 | 67.92 | 1.63 | 2.03 | 11.11 | 82.51 @ 25F |
| 1990 | 100.0 | 0.0 | 100.0 | 297.37 | 178.28 | 100.08 | 41.30 | 28.23 | 494.41 | 281.61 | 156.91 | 77.89 | 48.36 | 2.17 | 2.49 | 11.11 | 73.93 @ 50F |
| 1990 | 50.0 | 0.0 | 50.0 | 136.27 | 83.78 | 49.27 | 23.71 | 29.30 | 220.86 | 132.85 | 79.99 | 45.78 | 64.65 | 1.46 | 1.65 | 11.11 | 66.48 @ 75F |
| 1990 | 0.0 | 50.0 | 0.0 | 36.73 | 26.55 | 19.65 | 14.93 | 29.94 | 55.39 | 43.71 | 35.35 | 29.29 | 71.78 | 1.25 | 1.48 | 11.11 | 107.71 @100F |
| 1990 | 50.0 | 50.0 | 50.0 | 165.45 | 102.52 | 60.91 | 29.65 | 29.16 | 270.32 | 161.12 | 96.67 | 55.58 | 58.14 | 1.90 | 2.26 | 11.11 | |
| 1990 | 20.6 | 27.3 | 20.6 | 77.51 | 49.94 | 31.70 | 18.44 | 29.71 | 123.24 | 80.22 | 53.57 | 35.93 | 69.06 | 1.32 | 1.53 | 11.11 | |
| 1995 | 0.0 | 0.0 | 0.0 | 40.02 | 25.38 | 16.15 | 10.33 | 17.03 | 61.68 | 41.68 | 28.56 | 19.87 | 48.23 | 1.05 | 1.18 | 10.44 | 55.21 @ 0F |
| 1995 | 0.0 | 100.0 | 0.0 | 34.87 | 26.18 | 19.73 | 14.93 | 20.41 | 48.88 | 38.94 | 31.48 | 25.87 | 45.71 | 1.65 | 2.08 | 10.44 | 48.44 @ 25F |
| 1995 | 100.0 | 0.0 | 100.0 | 254.25 | 156.33 | 88.85 | 34.24 | 24.60 | 443.61 | 247.15 | 134.44 | 60.34 | 40.11 | 2.22 | 2.54 | 10.44 | 42.59 @ 50F |
| 1995 | 50.0 | 0.0 | 50.0 | 120.27 | 74.43 | 43.33 | 19.12 | 19.45 | 202.56 | 117.32 | 67.39 | 34.42 | 44.12 | 1.48 | 1.68 | 10.44 | 37.53 @ 75F |
| 1995 | 0.0 | 50.0 | 0.0 | 36.93 | 24.97 | 17.05 | 11.78 | 17.84 | 55.20 | 39.53 | 28.88 | 21.57 | 46.05 | 1.27 | 1.51 | 10.44 | 53.91 @100F |
| 1995 | 50.0 | 50.0 | 50.0 | 144.56 | 91.26 | 54.29 | 24.59 | 22.50 | 246.24 | 143.04 | 82.96 | 43.11 | 42.91 | 1.93 | 2.31 | 10.44 | |
| 1995 | 20.6 | 27.3 | 20.6 | 71.07 | 45.16 | 27.72 | 14.69 | 18.44 | 115.60 | 71.34 | 44.55 | 26.71 | 45.32 | 1.34 | 1.56 | 10.44 | |
| 2000 | 0.0 | 0.0 | 0.0 | 39.06 | 24.40 | 15.25 | 9.53 | 13.47 | 60.24 | 38.19 | 24.29 | 15.51 | 27.54 | 1.07 | 1.20 | 10.08 | 42.72 @ 0F |
| 2000 | 0.0 | 100.0 | 0.0 | 34.17 | 25.34 | 18.80 | 13.94 | 17.77 | 49.81 | 37.47 | 28.28 | 21.44 | 30.87 | 1.67 | 2.13 | 10.08 | 37.10 @ 25F |
| 2000 | 100.0 | 0.0 | 100.0 | 238.37 | 148.57 | 84.94 | 31.95 | 23.32 | 408.24 | 222.88 | 119.00 | 49.34 | 34.88 | 2.27 | 2.59 | 10.08 | 32.27 @ 50F |
| 2000 | 50.0 | 0.0 | 50.0 | 113.91 | 71.03 | 41.37 | 17.80 | 16.84 | 190.39 | 107.10 | 59.50 | 27.87 | 29.64 | 1.51 | 1.71 | 10.08 | 28.10 @ 75F |
| 2000 | 0.0 | 50.0 | 0.0 | 36.08 | 24.07 | 16.17 | 10.94 | 14.73 | 54.59 | 36.84 | 25.12 | 17.31 | 28.06 | 1.29 | 1.54 | 10.08 | 36.10 @100F |
| 2000 | 50.0 | 50.0 | 50.0 | 136.27 | 86.96 | 51.87 | 22.95 | 20.54 | 229.02 | 130.18 | 73.64 | 35.39 | 32.87 | 1.97 | 2.36 | 10.08 | |
| 2000 | 20.6 | 27.3 | 20.6 | 67.97 | 43.24 | 26.40 | 13.66 | 15.51 | 110.25 | 65.56 | 39.09 | 21.52 | 28.65 | 1.36 | 1.59 | 10.08 | |

TABLE 9 : CO AT 19.6 MPH.

## TABLE 10

## LOW ALTITUDE

### CO EMISSION FACTORS (GRAMS/MILE) AT 35.0 MPH

| CAl Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | LDGV 0°F | 25°F | 50°F | 75°F | 100°F | LDGT 0°F | 25°F | 50°F | 75°F | 100°F | -LDDV- 0-100F | -LDDT- 0-100F | -HDDV- 0-100F | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 28.16 | 25.07 | 22.58 | 20.57 | 43.17 | 40.62 | 36.55 | 33.21 | 30.49 | 56.59 | 0.55 | 0.91 | 8.32 | |
| 1980 | 0.0 | 100.0 | 0.0 | 20.09 | 20.70 | 21.43 | 22.30 | 42.26 | 30.15 | 31.07 | 32.08 | 33.19 | 60.77 | 0.94 | 1.58 | 8.32 | 128.74 @ 0F |
| 1980 | 100.0 | 0.0 | 100.0 | 236.05 | 137.83 | 80.90 | 47.53 | 29.45 | 319.84 | 189.08 | 112.71 | 67.79 | 40.36 | 1.16 | 1.94 | 8.32 | 117.34 @ 25F |
| 1980 | 50.0 | 0.0 | 50.0 | 107.33 | 67.94 | 44.66 | 30.67 | 37.19 | 147.77 | 95.01 | 63.59 | 44.63 | 49.56 | 0.78 | 1.29 | 8.32 | 107.05 @ 50F |
| 1980 | 0.0 | 50.0 | 0.0 | 24.66 | 23.06 | 21.86 | 20.99 | 42.13 | 36.15 | 34.08 | 32.47 | 31.27 | 57.42 | 0.69 | 1.16 | 8.32 | 97.75 @ 75F |
| 1980 | 50.0 | 50.0 | 50.0 | 128.07 | 79.27 | 51.17 | 34.91 | 35.85 | 174.99 | 110.07 | 72.39 | 50.49 | 50.57 | 1.05 | 1.76 | 8.32 | 166.68 @100F |
| 1980 | 20.6 | 27.3 | 20.6 | 58.58 | 41.47 | 31.19 | 24.91 | 40.14 | 81.94 | 59.07 | 45.21 | 36.67 | 54.14 | 0.72 | 1.20 | 8.32 | |
| 1985 | 0.0 | 0.0 | 0.0 | 21.26 | 16.81 | 13.61 | 11.27 | 28.13 | 34.06 | 28.51 | 24.15 | 20.70 | 50.08 | 0.57 | 0.66 | 7.07 | |
| 1985 | 0.0 | 100.0 | 0.0 | 15.64 | 14.31 | 13.41 | 12.85 | 24.94 | 23.09 | 22.79 | 22.66 | 22.69 | 45.83 | 0.90 | 1.16 | 7.07 | 103.43 @ 0F |
| 1985 | 100.0 | 0.0 | 100.0 | 182.49 | 107.68 | 60.82 | 28.94 | 18.61 | 275.27 | 157.17 | 89.47 | 49.82 | 29.70 | 1.17 | 1.42 | 7.07 | 94.39 @ 25F |
| 1985 | 50.0 | 0.0 | 50.0 | 81.89 | 50.91 | 31.24 | 17.75 | 23.87 | 123.13 | 75.92 | 48.09 | 31.22 | 41.43 | 0.80 | 0.94 | 7.07 | 86.48 @ 50F |
| 1985 | 0.0 | 50.0 | 0.0 | 18.63 | 15.49 | 13.25 | 11.64 | 26.27 | 29.29 | 25.84 | 23.16 | 21.09 | 47.48 | 0.69 | 0.84 | 7.07 | 79.52 @ 75F |
| 1985 | 50.0 | 50.0 | 50.0 | 99.06 | 60.99 | 37.12 | 20.90 | 21.77 | 149.18 | 89.98 | 56.07 | 36.25 | 37.76 | 1.04 | 1.29 | 7.07 | 140.19 @100F |
| 1985 | 20.6 | 27.3 | 20.6 | 44.57 | 30.00 | 20.60 | 14.11 | 25.36 | 67.80 | 46.39 | 33.37 | 25.19 | 45.10 | 0.73 | 0.87 | 7.07 | |
| 1988 | 0.0 | 0.0 | 0.0 | 20.36 | 14.62 | 10.76 | 8.13 | 19.86 | 31.35 | 24.56 | 19.58 | 15.86 | 42.42 | 0.58 | 0.64 | 6.45 | |
| 1988 | 0.0 | 100.0 | 0.0 | 16.16 | 13.47 | 11.50 | 10.06 | 18.09 | 21.99 | 20.25 | 18.97 | 18.05 | 37.54 | 0.90 | 1.13 | 6.45 | 68.62 @ 0F |
| 1988 | 100.0 | 0.0 | 100.0 | 160.38 | 95.45 | 53.51 | 23.02 | 15.32 | 247.82 | 142.63 | 80.54 | 41.78 | 25.23 | 1.20 | 1.38 | 6.45 | 61.83 @ 25F |
| 1988 | 50.0 | 0.0 | 50.0 | 72.80 | 44.85 | 26.68 | 13.56 | 17.63 | 110.89 | 67.87 | 41.83 | 25.16 | 35.06 | 0.81 | 0.92 | 6.45 | 55.92 @ 50F |
| 1988 | 0.0 | 50.0 | 0.0 | 18.22 | 13.80 | 10.76 | 8.66 | 18.67 | 27.14 | 22.40 | 18.93 | 16.34 | 39.62 | 0.69 | 0.82 | 6.45 | 50.77 @ 75F |
| 1988 | 50.0 | 50.0 | 50.0 | 88.27 | 54.46 | 32.50 | 16.54 | 16.71 | 134.91 | 81.44 | 49.76 | 29.92 | 31.38 | 1.05 | 1.26 | 6.45 | 84.51 @100F |
| 1988 | 20.6 | 27.3 | 20.6 | 40.59 | 26.51 | 17.25 | 10.62 | 18.29 | 61.49 | 41.04 | 28.29 | 19.91 | 37.86 | 0.73 | 0.85 | 6.45 | |
| 1990 | 0.0 | 0.0 | 0.0 | 20.32 | 13.85 | 9.62 | 6.82 | 15.39 | 30.64 | 22.88 | 17.42 | 13.51 | 36.44 | 0.58 | 0.64 | 6.16 | |
| 1990 | 0.0 | 100.0 | 0.0 | 16.82 | 13.38 | 10.84 | 8.95 | 14.84 | 22.29 | 19.51 | 17.43 | 15.89 | 32.22 | 0.90 | 1.13 | 6.16 | 51.51 @ 0F |
| 1990 | 100.0 | 0.0 | 100.0 | 148.31 | 89.12 | 50.08 | 20.56 | 14.09 | 235.66 | 134.77 | 75.29 | 37.23 | 23.12 | 1.20 | 1.38 | 6.16 | 46.00 @ 25F |
| 1990 | 50.0 | 0.0 | 50.0 | 68.21 | 41.99 | 24.69 | 11.84 | 14.50 | 106.03 | 63.95 | 38.56 | 22.02 | 30.64 | 0.81 | 0.91 | 6.16 | 41.22 @ 50F |
| 1990 | 0.0 | 50.0 | 0.0 | 18.43 | 13.29 | 9.82 | 7.45 | 14.76 | 26.76 | 21.06 | 17.01 | 14.08 | 33.98 | 0.69 | 0.82 | 6.16 | 37.06 @ 75F |
| 1990 | 50.0 | 50.0 | 50.0 | 82.56 | 51.25 | 30.46 | 14.76 | 14.47 | 128.98 | 77.14 | 46.36 | 26.56 | 27.67 | 1.05 | 1.25 | 6.16 | 60.05 @100F |
| 1990 | 20.6 | 27.3 | 20.6 | 38.83 | 25.02 | 15.87 | 9.20 | 14.67 | 59.27 | 38.63 | 25.81 | 17.28 | 32.71 | 0.73 | 0.85 | 6.16 | |
| 1995 | 0.0 | 0.0 | 0.0 | 20.29 | 12.85 | 8.17 | 5.21 | 8.51 | 30.32 | 20.37 | 13.87 | 9.58 | 22.72 | 0.58 | 0.65 | 5.79 | |
| 1995 | 0.0 | 100.0 | 0.0 | 17.69 | 13.26 | 9.98 | 7.54 | 10.25 | 24.07 | 19.05 | 15.29 | 12.46 | 21.71 | 0.91 | 1.15 | 5.79 | 30.78 @ 0F |
| 1995 | 100.0 | 0.0 | 100.0 | 128.61 | 79.15 | 45.00 | 17.30 | 12.44 | 215.82 | 120.41 | 65.52 | 29.15 | 19.46 | 1.23 | 1.41 | 5.79 | 27.00 @ 25F |
| 1995 | 50.0 | 0.0 | 50.0 | 60.90 | 37.70 | 21.95 | 9.66 | 9.78 | 99.01 | 57.34 | 32.88 | 16.65 | 20.97 | 0.82 | 0.93 | 5.79 | 23.74 @ 50F |
| 1995 | 0.0 | 50.0 | 0.0 | 18.72 | 12.64 | 8.62 | 5.95 | 8.93 | 27.14 | 19.32 | 14.03 | 10.40 | 21.75 | 0.70 | 0.84 | 5.79 | 20.92 @ 75F |
| 1995 | 50.0 | 50.0 | 50.0 | 73.15 | 46.21 | 27.49 | 12.42 | 11.34 | 119.95 | 69.73 | 40.40 | 20.81 | 20.58 | 1.07 | 1.28 | 5.79 | 30.05 @100F |
| 1995 | 20.6 | 27.3 | 20.6 | 36.01 | 22.87 | 14.03 | 7.42 | 9.25 | 56.61 | 34.87 | 21.70 | 12.90 | 21.45 | 0.74 | 0.87 | 5.79 | |
| 2000 | 0.0 | 0.0 | 0.0 | 19.90 | 12.43 | 7.77 | 4.85 | 6.86 | 30.37 | 19.20 | 12.18 | 7.75 | 13.51 | 0.59 | 0.67 | 5.59 | |
| 2000 | 0.0 | 100.0 | 0.0 | 17.41 | 12.91 | 9.58 | 7.10 | 9.05 | 25.14 | 18.87 | 14.20 | 10.72 | 15.29 | 0.93 | 1.18 | 5.59 | 23.82 @ 0F |
| 2000 | 100.0 | 0.0 | 100.0 | 121.43 | 75.69 | 43.27 | 16.28 | 11.88 | 205.25 | 112.06 | 59.82 | 24.70 | 17.50 | 1.26 | 1.44 | 5.59 | 20.69 @ 25F |
| 2000 | 50.0 | 0.0 | 50.0 | 58.03 | 36.18 | 21.08 | 9.07 | 8.58 | 95.84 | 53.89 | 29.91 | 13.95 | 14.68 | 0.84 | 0.95 | 5.59 | 17.99 @ 50F |
| 2000 | 0.0 | 50.0 | 0.0 | 18.38 | 12.26 | 8.24 | 5.57 | 7.50 | 27.52 | 18.53 | 12.60 | 8.65 | 13.82 | 0.71 | 0.85 | 5.59 | 15.67 @ 75F |
| 2000 | 50.0 | 50.0 | 50.0 | 69.42 | 44.30 | 26.42 | 11.69 | 10.46 | 115.19 | 65.46 | 37.01 | 17.71 | 16.39 | 1.09 | 1.31 | 5.59 | 20.13 @100F |
| 2000 | 20.6 | 27.3 | 20.6 | 34.63 | 22.03 | 13.45 | 6.96 | 7.90 | 55.53 | 32.98 | 19.63 | 10.76 | 14.14 | 0.76 | 0.88 | 5.59 | |

TABLE 10 : CO AT 35.0 MPH

# TABLE 11

## LOW ALTITUDE

## CO EMISSION FACTORS (GRAMS/MILE) AT 50.0 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | LDGV | | | | | LDGT | | | | | -LDDV- | -LDDT- | -HDDV- | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0°F | 25°F | 50°F | 75°F | 100°F | 0°F | 25°F | 50°F | 75°F | 100°F | 0-100F | 0-100F | 0-100F | |
| 1980 | 0.0 | 0.0 | 0.0 | 20.99 | 18.78 | 16.99 | 15.55 | 32.17 | 31.21 | 28.13 | 25.61 | 23.56 | 43.59 | 0.47 | 0.78 | 7.09 | 120.33 @ 0F |
| 1980 | 0.0 | 100.0 | 0.0 | 14.94 | 15.44 | 16.02 | 16.69 | 31.33 | 23.21 | 23.91 | 24.69 | 25.53 | 46.39 | 0.80 | 1.35 | 7.09 | 109.68 @ 25F |
| 1980 | 100.0 | 0.0 | 100.0 | 171.26 | 100.38 | 59.21 | 35.05 | 21.79 | 241.23 | 142.99 | 85.50 | 51.61 | 30.92 | 0.99 | 1.65 | 7.09 | 100.06 @ 50F |
| 1980 | 50.0 | 0.0 | 50.0 | 78.81 | 50.11 | 33.13 | 22.93 | 27.61 | 112.29 | 72.41 | 48.62 | 34.25 | 38.07 | 0.66 | 1.10 | 7.09 | 91.37 @ 75F |
| 1980 | 0.0 | 50.0 | 0.0 | 18.36 | 17.24 | 16.41 | 15.82 | 31.32 | 27.78 | 26.22 | 25.01 | 24.12 | 44.05 | 0.59 | 0.99 | 7.09 | 155.80 @100F |
| 1980 | 50.0 | 50.0 | 50.0 | 93.10 | 57.91 | 37.61 | 25.87 | 26.56 | 132.22 | 83.45 | 55.09 | 38.57 | 38.66 | 0.89 | 1.50 | 7.09 | |
| 1980 | 20.6 | 27.3 | 20.6 | 43.17 | 30.73 | 23.26 | 18.70 | 29.83 | 62.46 | 45.17 | 34.68 | 28.22 | 41.56 | 0.61 | 1.02 | 7.09 | |
| 1985 | 0.0 | 0.0 | 0.0 | 14.07 | 11.36 | 9.37 | 7.89 | 19.61 | 22.51 | 19.08 | 16.36 | 14.19 | 32.85 | 0.49 | 0.57 | 6.03 | 96.68 @ 0F |
| 1985 | 0.0 | 100.0 | 0.0 | 9.93 | 9.29 | 8.89 | 8.67 | 16.96 | 15.01 | 14.96 | 15.02 | 15.16 | 30.17 | 0.77 | 0.99 | 6.03 | 88.23 @ 25F |
| 1985 | 100.0 | 0.0 | 100.0 | 116.55 | 68.36 | 38.74 | 19.18 | 12.29 | 174.22 | 100.09 | 57.45 | 32.47 | 19.34 | 1.00 | 1.21 | 6.03 | 80.83 @ 50F |
| 1985 | 50.0 | 0.0 | 50.0 | 53.01 | 32.94 | 20.42 | 12.06 | 16.34 | 79.45 | 49.40 | 31.65 | 20.89 | 27.06 | 0.68 | 0.80 | 6.03 | 74.33 @ 75F |
| 1985 | 0.0 | 50.0 | 0.0 | 12.15 | 10.31 | 8.99 | 8.04 | 18.13 | 19.26 | 17.19 | 15.58 | 14.34 | 31.18 | 0.59 | 0.72 | 6.03 | 131.04 @100F |
| 1985 | 50.0 | 50.0 | 50.0 | 63.24 | 38.83 | 23.82 | 13.93 | 14.63 | 94.61 | 57.53 | 36.23 | 23.81 | 24.76 | 0.88 | 1.10 | 6.03 | |
| 1985 | 20.6 | 27.3 | 20.6 | 28.92 | 19.60 | 13.67 | 9.67 | 17.46 | 43.98 | 30.42 | 22.17 | 17.00 | 29.56 | 0.62 | 0.75 | 6.03 | |
| 1988 | 0.0 | 0.0 | 0.0 | 12.15 | 8.93 | 6.73 | 5.20 | 13.01 | 19.04 | 15.17 | 12.29 | 10.11 | 25.99 | 0.49 | 0.55 | 5.50 | 64.14 @ 0F |
| 1988 | 0.0 | 100.0 | 0.0 | 9.26 | 7.88 | 6.88 | 6.16 | 11.35 | 12.92 | 12.08 | 11.49 | 11.09 | 22.90 | 0.77 | 0.96 | 5.50 | 57.79 @ 25F |
| 1988 | 100.0 | 0.0 | 100.0 | 94.22 | 55.68 | 31.22 | 13.90 | 9.19 | 145.49 | 83.86 | 47.57 | 25.11 | 15.10 | 1.02 | 1.18 | 5.50 | 52.27 @ 50F |
| 1988 | 50.0 | 0.0 | 50.0 | 43.14 | 26.53 | 15.90 | 8.39 | 11.20 | 66.13 | 40.68 | 25.31 | 15.56 | 21.29 | 0.69 | 0.78 | 5.50 | 47.45 @ 75F |
| 1988 | 0.0 | 50.0 | 0.0 | 10.72 | 8.29 | 6.61 | 5.44 | 12.03 | 16.31 | 13.68 | 11.74 | 10.29 | 24.23 | 0.59 | 0.70 | 5.50 | 78.99 @100F |
| 1988 | 50.0 | 50.0 | 50.0 | 51.74 | 31.78 | 19.05 | 10.03 | 10.27 | 79.20 | 47.97 | 29.53 | 18.10 | 19.00 | 0.89 | 1.07 | 5.50 | |
| 1988 | 20.6 | 27.3 | 20.6 | 24.02 | 15.76 | 10.41 | 6.63 | 11.73 | 36.76 | 24.76 | 17.30 | 12.42 | 23.10 | 0.63 | 0.72 | 5.50 | |
| 1990 | 0.0 | 0.0 | 0.0 | 11.44 | 7.94 | 5.62 | 4.08 | 9.54 | 17.73 | 13.46 | 10.42 | 8.22 | 21.56 | 0.49 | 0.55 | 5.25 | 48.15 @ 0F |
| 1990 | 0.0 | 100.0 | 0.0 | 9.20 | 7.43 | 6.11 | 5.15 | 8.76 | 12.46 | 11.07 | 10.04 | 9.29 | 18.85 | 0.77 | 0.96 | 5.25 | 43.00 @ 25F |
| 1990 | 100.0 | 0.0 | 100.0 | 82.91 | 49.54 | 27.82 | 11.70 | 7.97 | 132.70 | 75.98 | 42.60 | 21.40 | 13.22 | 1.02 | 1.18 | 5.25 | 38.53 @ 50F |
| 1990 | 50.0 | 0.0 | 50.0 | 38.35 | 23.57 | 13.93 | 6.87 | 8.67 | 60.47 | 36.64 | 22.28 | 12.99 | 17.90 | 0.69 | 0.78 | 5.25 | 34.64 @ 75F |
| 1990 | 0.0 | 50.0 | 0.0 | 10.27 | 7.52 | 5.66 | 4.38 | 8.97 | 15.31 | 12.24 | 10.04 | 8.44 | 20.01 | 0.59 | 0.70 | 5.25 | 56.13 @100F |
| 1990 | 50.0 | 50.0 | 50.0 | 46.05 | 28.48 | 16.97 | 8.42 | 8.36 | 72.58 | 43.52 | 26.32 | 15.35 | 16.03 | 0.90 | 1.07 | 5.25 | |
| 1990 | 20.6 | 27.3 | 20.6 | 21.78 | 14.09 | 9.03 | 5.38 | 8.87 | 33.85 | 22.25 | 15.05 | 10.28 | 19.21 | 0.63 | 0.72 | 5.25 | |
| 1995 | 0.0 | 0.0 | 0.0 | 10.62 | 6.75 | 4.30 | 2.76 | 4.59 | 16.01 | 10.81 | 7.41 | 5.16 | 12.15 | 0.50 | 0.56 | 4.93 | 28.77 @ 0F |
| 1995 | 0.0 | 100.0 | 0.0 | 9.22 | 6.93 | 5.22 | 3.95 | 5.41 | 12.54 | 9.95 | 8.02 | 6.57 | 11.46 | 0.78 | 0.98 | 4.93 | 25.24 @ 25F |
| 1995 | 100.0 | 0.0 | 100.0 | 67.26 | 41.35 | 23.49 | 9.06 | 6.51 | 112.44 | 62.78 | 34.20 | 15.27 | 10.18 | 1.05 | 1.20 | 4.93 | 22.19 @ 50F |
| 1995 | 50.0 | 0.0 | 50.0 | 31.89 | 19.73 | 11.49 | 5.08 | 5.19 | 51.89 | 30.11 | 17.31 | 8.83 | 11.11 | 0.70 | 0.79 | 4.93 | 19.56 @ 75F |
| 1995 | 0.0 | 50.0 | 0.0 | 9.78 | 6.62 | 4.53 | 3.13 | 4.77 | 14.26 | 10.20 | 7.44 | 5.55 | 11.57 | 0.60 | 0.71 | 4.93 | 28.09 @100F |
| 1995 | 50.0 | 50.0 | 50.0 | 38.24 | 24.14 | 14.36 | 6.51 | 5.96 | 62.49 | 36.37 | 21.11 | 10.92 | 10.82 | 0.91 | 1.09 | 4.93 | |
| 1995 | 20.6 | 27.3 | 20.6 | 18.84 | 11.97 | 7.35 | 3.90 | 4.93 | 29.70 | 18.34 | 11.46 | 6.86 | 11.40 | 0.63 | 0.74 | 4.93 | |
| 2000 | 0.0 | 0.0 | 0.0 | 10.31 | 6.44 | 4.03 | 2.52 | 3.56 | 15.61 | 9.85 | 6.23 | 3.95 | 6.79 | 0.50 | 0.57 | 4.76 | 22.26 @ 0F |
| 2000 | 0.0 | 100.0 | 0.0 | 9.02 | 6.69 | 4.96 | 3.68 | 4.69 | 12.93 | 9.69 | 7.27 | 5.48 | 7.75 | 0.79 | 1.00 | 4.76 | 19.34 @ 25F |
| 2000 | 100.0 | 0.0 | 100.0 | 62.95 | 39.24 | 22.43 | 8.44 | 6.16 | 105.30 | 57.49 | 30.68 | 12.63 | 8.96 | 1.07 | 1.23 | 4.76 | 16.82 @ 50F |
| 2000 | 50.0 | 0.0 | 50.0 | 30.08 | 18.76 | 10.93 | 4.70 | 4.45 | 49.22 | 27.66 | 15.34 | 7.13 | 7.44 | 0.71 | 0.81 | 4.76 | 14.65 @ 75F |
| 2000 | 0.0 | 50.0 | 0.0 | 9.53 | 6.36 | 4.27 | 2.89 | 3.89 | 14.15 | 9.51 | 6.45 | 4.42 | 6.97 | 0.61 | 0.73 | 4.76 | 18.81 @100F |
| 2000 | 50.0 | 50.0 | 50.0 | 35.99 | 22.97 | 13.70 | 6.06 | 5.43 | 59.12 | 33.59 | 18.98 | 9.05 | 8.36 | 0.93 | 1.11 | 4.76 | |
| 2000 | 20.6 | 27.3 | 20.6 | 17.95 | 11.42 | 6.97 | 3.61 | 4.10 | 28.53 | 16.93 | 10.06 | 5.50 | 7.14 | 0.64 | 0.75 | 4.76 | |

TABLE 11 : CO AT 50.0 MPH.

# TABLE 12

## LOW ALTITUDE

### CO EMISSION FACTORS (GRAMS/MILE) AT 55.0 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | LDGV | | | | | LDGT | | | | | -LDDV- | -LDDT- | -HDDV- | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0°F | 25°F | 50°F | 75°F | 100°F | 0°F | 25°F | 50°F | 75°F | 100°F | 0-100F | 0-100F | 0-100F | |
| 1980 | 0.0 | 0.0 | 0.0 | 19.15 | 17.19 | 15.61 | 14.34 | 29.26 | 28.78 | 26.00 | 23.74 | 21.90 | 40.07 | 0.49 | 0.81 | 7.37 | |
| 1980 | 0.0 | 100.0 | 0.0 | 13.69 | 14.16 | 14.72 | 15.36 | 28.69 | 21.53 | 22.20 | 22.93 | 23.73 | 42.90 | 0.83 | 1.40 | 7.37 | 131.34 @ 0F |
| 1980 | 100.0 | 0.0 | 100.0 | 155.18 | 91.21 | 53.97 | 32.07 | 19.95 | 221.30 | 131.49 | 78.83 | 47.71 | 28.61 | 1.02 | 1.72 | 7.37 | 119.71 @ 25F |
| 1980 | 50.0 | 0.0 | 50.0 | 71.61 | 45.67 | 30.31 | 21.07 | 25.17 | 103.20 | 66.73 | 44.94 | 31.75 | 35.07 | 0.69 | 1.14 | 7.37 | 109.21 @ 50F |
| 1980 | 0.0 | 50.0 | 0.0 | 16.77 | 15.80 | 15.09 | 14.58 | 28.57 | 25.67 | 24.28 | 23.21 | 22.42 | 40.61 | 0.61 | 1.02 | 7.37 | 99.73 @ 75F |
| 1980 | 50.0 | 50.0 | 50.0 | 84.43 | 52.69 | 34.34 | 23.72 | 24.32 | 121.41 | 76.85 | 50.88 | 35.72 | 35.75 | 0.93 | 1.56 | 7.37 | 170.04 @100F |
| 1980 | 20.6 | 27.3 | 20.6 | 39.28 | 28.07 | 21.32 | 17.21 | 27.20 | 57.48 | 41.69 | 32.11 | 26.20 | 38.30 | 0.64 | 1.06 | 7.37 | |
| 1985 | 0.0 | 0.0 | 0.0 | 12.30 | 10.00 | 8.31 | 7.04 | 17.37 | 19.86 | 16.92 | 14.58 | 12.71 | 28.84 | 0.51 | 0.59 | 6.26 | |
| 1985 | 0.0 | 100.0 | 0.0 | 8.58 | 8.10 | 7.81 | 7.67 | 15.00 | 13.23 | 13.23 | 13.33 | 13.49 | 26.69 | 0.79 | 1.03 | 6.26 | 105.52 @ 0F |
| 1985 | 100.0 | 0.0 | 100.0 | 100.93 | 59.15 | 33.59 | 16.86 | 10.80 | 151.95 | 87.55 | 50.44 | 28.67 | 17.06 | 1.04 | 1.26 | 6.26 | 96.30 @ 25F |
| 1985 | 50.0 | 0.0 | 50.0 | 46.06 | 28.65 | 17.84 | 10.68 | 14.43 | 69.65 | 43.46 | 27.98 | 18.59 | 23.79 | 0.70 | 0.83 | 6.26 | 88.23 @ 50F |
| 1985 | 0.0 | 50.0 | 0.0 | 10.59 | 9.06 | 7.95 | 7.15 | 16.06 | 16.99 | 15.23 | 13.87 | 12.82 | 27.46 | 0.61 | 0.75 | 6.26 | 81.12 @ 75F |
| 1985 | 50.0 | 50.0 | 50.0 | 54.76 | 33.63 | 20.70 | 12.27 | 12.90 | 82.59 | 50.39 | 31.88 | 21.08 | 21.87 | 0.92 | 1.14 | 6.26 | 143.02 @100F |
| 1985 | 20.6 | 27.3 | 20.6 | 25.15 | 17.10 | 12.00 | 8.58 | 15.45 | 38.62 | 26.83 | 19.66 | 15.16 | 26.01 | 0.64 | 0.77 | 6.26 | |
| 1988 | 0.0 | 0.0 | 0.0 | 10.25 | 7.60 | 5.77 | 4.50 | 11.28 | 16.31 | 13.08 | 10.67 | 8.83 | 22.31 | 0.51 | 0.57 | 5.71 | |
| 1988 | 0.0 | 100.0 | 0.0 | 7.72 | 6.62 | 5.82 | 5.26 | 9.76 | 10.97 | 10.32 | 9.88 | 9.59 | 19.72 | 0.80 | 1.00 | 5.71 | 70.00 @ 0F |
| 1988 | 100.0 | 0.0 | 100.0 | 79.18 | 46.71 | 26.21 | 11.81 | 7.79 | 123.49 | 71.25 | 40.51 | 21.53 | 12.92 | 1.06 | 1.22 | 5.71 | 63.08 @ 25F |
| 1988 | 50.0 | 0.0 | 50.0 | 36.33 | 22.35 | 13.43 | 7.19 | 9.64 | 56.37 | 34.76 | 21.72 | 13.46 | 18.25 | 0.71 | 0.81 | 5.71 | 57.05 @ 50F |
| 1988 | 0.0 | 50.0 | 0.0 | 9.01 | 7.02 | 5.65 | 4.68 | 10.40 | 13.94 | 11.77 | 10.16 | 8.95 | 20.82 | 0.61 | 0.73 | 5.71 | 51.79 @ 75F |
| 1988 | 50.0 | 50.0 | 50.0 | 43.45 | 26.66 | 16.02 | 8.54 | 8.77 | 67.23 | 40.79 | 25.19 | 15.56 | 16.32 | 0.93 | 1.11 | 5.71 | 86.22 @100F |
| 1988 | 20.6 | 27.3 | 20.6 | 20.22 | 13.30 | 8.83 | 5.69 | 10.12 | 31.37 | 21.21 | 14.90 | 10.78 | 19.83 | 0.65 | 0.75 | 5.71 | |
| 1990 | 0.0 | 0.0 | 0.0 | 9.46 | 6.61 | 4.71 | 3.44 | 8.12 | 14.92 | 11.40 | 8.89 | 7.06 | 18.26 | 0.51 | 0.57 | 5.45 | |
| 1990 | 0.0 | 100.0 | 0.0 | 7.54 | 6.12 | 5.07 | 4.29 | 7.37 | 10.36 | 9.26 | 8.45 | 7.88 | 15.97 | 0.80 | 1.00 | 5.45 | 52.55 @ 0F |
| 1990 | 100.0 | 0.0 | 100.0 | 68.44 | 40.83 | 22.93 | 9.73 | 6.61 | 110.73 | 63.44 | 35.62 | 18.02 | 11.10 | 1.06 | 1.22 | 5.45 | 46.93 @ 25F |
| 1990 | 50.0 | 0.0 | 50.0 | 31.71 | 19.48 | 11.53 | 5.75 | 7.31 | 50.65 | 30.75 | 18.77 | 11.04 | 15.13 | 0.71 | 0.81 | 5.45 | 42.05 @ 50F |
| 1990 | 0.0 | 50.0 | 0.0 | 8.46 | 6.23 | 4.72 | 3.68 | 7.61 | 12.84 | 10.33 | 8.53 | 7.22 | 16.96 | 0.62 | 0.73 | 5.45 | 37.81 @ 75F |
| 1990 | 50.0 | 50.0 | 50.0 | 37.99 | 23.47 | 14.00 | 7.01 | 6.99 | 60.54 | 36.35 | 22.04 | 12.95 | 13.54 | 0.93 | 1.11 | 5.45 | 61.26 @100F |
| 1990 | 20.6 | 27.3 | 20.6 | 18.00 | 11.66 | 7.50 | 4.51 | 7.50 | 28.36 | 18.71 | 12.72 | 8.76 | 16.26 | 0.65 | 0.75 | 5.45 | |
| 1995 | 0.0 | 0.0 | 0.0 | 8.56 | 5.44 | 3.47 | 2.23 | 3.74 | 12.98 | 8.79 | 6.05 | 4.23 | 9.92 | 0.52 | 0.58 | 5.12 | |
| 1995 | 0.0 | 100.0 | 0.0 | 7.42 | 5.58 | 4.21 | 3.19 | 4.38 | 10.12 | 8.04 | 6.49 | 5.33 | 9.32 | 0.81 | 1.02 | 5.12 | 31.40 @ 0F |
| 1995 | 100.0 | 0.0 | 100.0 | 54.20 | 33.30 | 18.92 | 7.30 | 5.24 | 90.78 | 50.71 | 27.64 | 12.37 | 8.24 | 1.09 | 1.25 | 5.12 | 27.55 @ 25F |
| 1995 | 50.0 | 0.0 | 50.0 | 25.70 | 15.90 | 9.26 | 4.10 | 4.20 | 41.98 | 24.37 | 14.04 | 7.18 | 9.04 | 0.73 | 0.82 | 5.12 | 24.22 @ 50F |
| 1995 | 0.0 | 50.0 | 0.0 | 7.88 | 5.34 | 3.65 | 2.53 | 3.87 | 11.55 | 8.27 | 6.05 | 4.53 | 9.43 | 0.62 | 0.74 | 5.12 | 21.35 @ 75F |
| 1995 | 50.0 | 50.0 | 50.0 | 30.81 | 19.44 | 11.56 | 5.25 | 4.81 | 50.45 | 29.38 | 17.07 | 8.85 | 8.78 | 0.95 | 1.13 | 5.12 | 30.66 @100F |
| 1995 | 20.6 | 27.3 | 20.6 | 15.18 | 9.65 | 5.93 | 3.15 | 4.00 | 24.03 | 14.86 | 9.31 | 5.59 | 9.28 | 0.66 | 0.77 | 5.12 | |
| 2000 | 0.0 | 0.0 | 0.0 | 8.29 | 5.18 | 3.23 | 2.02 | 2.86 | 12.51 | 7.89 | 4.99 | 3.16 | 5.41 | 0.52 | 0.59 | 4.95 | |
| 2000 | 0.0 | 100.0 | 0.0 | 7.25 | 5.38 | 3.99 | 2.96 | 3.77 | 10.37 | 7.76 | 5.82 | 4.38 | 6.18 | 0.82 | 1.04 | 4.95 | 24.30 @ 0F |
| 2000 | 100.0 | 0.0 | 100.0 | 50.57 | 31.52 | 18.02 | 6.78 | 4.95 | 84.33 | 46.04 | 24.57 | 10.10 | 7.18 | 1.11 | 1.27 | 4.95 | 21.10 @ 25F |
| 2000 | 50.0 | 0.0 | 50.0 | 24.17 | 15.07 | 8.78 | 3.78 | 3.57 | 39.43 | 22.16 | 12.28 | 5.71 | 5.94 | 0.74 | 0.84 | 4.95 | 18.35 @ 50F |
| 2000 | 0.0 | 50.0 | 0.0 | 7.66 | 5.11 | 3.43 | 2.32 | 3.12 | 11.34 | 7.62 | 5.16 | 3.53 | 5.55 | 0.63 | 0.75 | 4.95 | 15.98 @ 75F |
| 2000 | 50.0 | 50.0 | 50.0 | 28.91 | 18.45 | 11.00 | 4.87 | 4.36 | 47.35 | 26.90 | 15.20 | 7.24 | 6.68 | 0.97 | 1.16 | 4.95 | 20.53 @100F |
| 2000 | 20.6 | 27.3 | 20.6 | 14.42 | 9.17 | 5.60 | 2.90 | 3.29 | 22.85 | 13.56 | 8.06 | 4.40 | 5.70 | 0.67 | 0.78 | 4.95 | |

**TABLE 12 : CO AT 55.0 MPH.**

TABLE 13

LOW ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 5.0 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | LDGV | | | | | LDGT | | | | | -LDDV- | -LDDT- | -HDDV- | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0°F | 25°F | 50°F | 75°F | 100°F | 0°F | 25°F | 50°F | 75°F | 100°F | 0-100F | 0-100F | 0-100F | |
| 1980 | 0.0 | 0.0 | 0.0 | 3.44 | 2.98 | 2.60 | 2.27 | 1.68 | 4.37 | 3.83 | 3.37 | 2.97 | 2.29 | 2.09 | 2.81 | 38.90 | |
| 1980 | 0.0 | 100.0 | 0.0 | 4.79 | 4.23 | 3.75 | 3.33 | 2.35 | 6.18 | 5.50 | 4.91 | 4.40 | 3.18 | 2.44 | 3.36 | 38.90 | 7.01 @ 0F |
| 1980 | 100.0 | 0.0 | 100.0 | 4.13 | 3.81 | 3.56 | 3.36 | 2.56 | 4.57 | 4.46 | 4.40 | 4.37 | 3.59 | 2.63 | 3.64 | 38.90 | 6.53 @ 25F |
| 1980 | 50.0 | 0.0 | 50.0 | 3.83 | 3.45 | 3.13 | 2.87 | 2.18 | 4.52 | 4.21 | 3.96 | 3.76 | 3.02 | 2.34 | 3.18 | 38.90 | 6.10 @ 50F |
| 1980 | 0.0 | 50.0 | 0.0 | 4.20 | 3.69 | 3.24 | 2.86 | 2.06 | 5.40 | 4.77 | 4.24 | 3.78 | 2.80 | 2.25 | 3.06 | 38.90 | 5.72 @ 75F |
| 1980 | 50.0 | 50.0 | 50.0 | 4.46 | 4.02 | 3.65 | 3.34 | 2.45 | 5.37 | 4.98 | 4.65 | 4.38 | 3.38 | 2.54 | 3.50 | 38.90 | 4.12 @100F |
| 1980 | 20.6 | 27.3 | 20.6 | 4.02 | 3.56 | 3.17 | 2.84 | 2.10 | 5.00 | 4.50 | 4.09 | 3.74 | 2.87 | 2.28 | 3.10 | 38.90 | |
| 1985 | 0.0 | 0.0 | 0.0 | 2.59 | 2.24 | 1.94 | 1.68 | 1.05 | 4.21 | 3.64 | 3.16 | 2.75 | 1.91 | 2.14 | 2.35 | 32.53 | |
| 1985 | 0.0 | 100.0 | 0.0 | 3.84 | 3.32 | 2.88 | 2.50 | 1.55 | 6.20 | 5.49 | 4.88 | 4.34 | 2.83 | 2.18 | 2.80 | 32.53 | 5.79 @ 0F |
| 1985 | 100.0 | 0.0 | 100.0 | 3.82 | 3.40 | 3.05 | 2.75 | 1.59 | 6.21 | 5.45 | 4.84 | 4.35 | 2.79 | 2.32 | 3.02 | 32.53 | 5.43 @ 25F |
| 1985 | 50.0 | 0.0 | 50.0 | 3.20 | 2.82 | 2.49 | 2.22 | 1.33 | 5.21 | 4.56 | 4.02 | 3.58 | 2.38 | 2.22 | 2.65 | 32.53 | 5.11 @ 50F |
| 1985 | 0.0 | 50.0 | 0.0 | 3.23 | 2.79 | 2.42 | 2.11 | 1.31 | 5.24 | 4.60 | 4.05 | 3.58 | 2.40 | 2.16 | 2.55 | 32.53 | 4.83 @ 75F |
| 1985 | 50.0 | 50.0 | 50.0 | 3.83 | 3.36 | 2.96 | 2.63 | 1.57 | 6.20 | 5.47 | 4.86 | 4.34 | 2.81 | 2.25 | 2.91 | 32.53 | 3.59 @100F |
| 1985 | 20.6 | 27.3 | 20.6 | 3.19 | 2.78 | 2.43 | 2.14 | 1.31 | 5.19 | 4.55 | 4.00 | 3.54 | 2.37 | 2.18 | 2.59 | 32.53 | |
| 1988 | 0.0 | 0.0 | 0.0 | 2.40 | 2.05 | 1.76 | 1.52 | 0.82 | 4.23 | 3.63 | 3.12 | 2.69 | 1.77 | 1.81 | 2.06 | 27.71 | |
| 1988 | 0.0 | 100.0 | 0.0 | 3.75 | 3.16 | 2.67 | 2.27 | 1.28 | 6.22 | 5.47 | 4.82 | 4.25 | 2.65 | 1.81 | 2.45 | 27.71 | 5.46 @ 0F |
| 1988 | 100.0 | 0.0 | 100.0 | 3.77 | 3.32 | 2.92 | 2.59 | 1.30 | 6.65 | 5.70 | 4.92 | 4.29 | 2.48 | 1.93 | 2.63 | 27.71 | 5.16 @ 25F |
| 1988 | 50.0 | 0.0 | 50.0 | 3.06 | 2.66 | 2.32 | 2.04 | 1.06 | 5.42 | 4.66 | 4.02 | 3.50 | 2.14 | 1.86 | 2.32 | 27.71 | 4.88 @ 50F |
| 1988 | 0.0 | 50.0 | 0.0 | 3.05 | 2.59 | 2.21 | 1.89 | 1.05 | 5.23 | 4.56 | 3.98 | 3.48 | 2.22 | 1.81 | 2.23 | 27.71 | 4.63 @ 75F |
| 1988 | 50.0 | 50.0 | 50.0 | 3.76 | 3.24 | 2.80 | 2.43 | 1.29 | 6.43 | 5.59 | 4.87 | 4.27 | 2.57 | 1.87 | 2.54 | 27.71 | 2.83 @100F |
| 1988 | 20.6 | 27.3 | 20.6 | 3.02 | 2.60 | 2.24 | 1.93 | 1.04 | 5.27 | 4.56 | 3.96 | 3.46 | 2.17 | 1.83 | 2.26 | 27.71 | |
| 1990 | 0.0 | 0.0 | 0.0 | 2.37 | 2.02 | 1.73 | 1.48 | 0.73 | 4.12 | 3.53 | 3.03 | 2.60 | 1.60 | 1.70 | 1.83 | 23.77 | |
| 1990 | 0.0 | 100.0 | 0.0 | 3.83 | 3.18 | 2.64 | 2.21 | 1.18 | 6.16 | 5.34 | 4.65 | 4.05 | 2.43 | 1.69 | 2.17 | 23.77 | 5.47 @ 0F |
| 1990 | 100.0 | 0.0 | 100.0 | 3.80 | 3.32 | 2.91 | 2.56 | 1.20 | 6.49 | 5.55 | 4.77 | 4.13 | 2.23 | 1.80 | 2.33 | 23.77 | 5.19 @ 25F |
| 1990 | 50.0 | 0.0 | 50.0 | 3.04 | 2.64 | 2.29 | 1.99 | 0.96 | 5.27 | 4.52 | 3.88 | 3.35 | 1.92 | 1.74 | 2.05 | 23.77 | 4.92 @ 50F |
| 1990 | 0.0 | 50.0 | 0.0 | 3.06 | 2.57 | 2.17 | 1.83 | 0.95 | 5.13 | 4.43 | 3.83 | 3.32 | 2.02 | 1.70 | 1.98 | 23.77 | 4.67 @ 75F |
| 1990 | 50.0 | 50.0 | 50.0 | 3.81 | 3.25 | 2.78 | 2.38 | 1.19 | 6.32 | 5.45 | 4.71 | 4.09 | 2.33 | 1.74 | 2.25 | 23.77 | 2.61 @100F |
| 1990 | 20.6 | 27.3 | 20.6 | 3.02 | 2.57 | 2.20 | 1.88 | 0.94 | 5.14 | 4.43 | 3.82 | 3.30 | 1.96 | 1.72 | 2.00 | 23.77 | |
| 1995 | 0.0 | 0.0 | 0.0 | 2.35 | 2.00 | 1.70 | 1.44 | 0.61 | 3.89 | 3.31 | 2.81 | 2.39 | 1.24 | 1.61 | 1.67 | 19.93 | |
| 1995 | 0.0 | 100.0 | 0.0 | 4.02 | 3.26 | 2.65 | 2.15 | 1.07 | 6.05 | 5.07 | 4.26 | 3.59 | 1.96 | 1.59 | 1.97 | 19.93 | 5.52 @ 0F |
| 1995 | 100.0 | 0.0 | 100.0 | 3.80 | 3.32 | 2.90 | 2.54 | 1.09 | 5.91 | 5.06 | 4.34 | 3.74 | 1.77 | 1.68 | 2.12 | 19.93 | 5.25 @ 25F |
| 1995 | 50.0 | 0.0 | 50.0 | 3.02 | 2.61 | 2.26 | 1.95 | 0.83 | 4.85 | 4.14 | 3.54 | 3.03 | 1.50 | 1.64 | 1.87 | 19.93 | 5.00 @ 50F |
| 1995 | 0.0 | 50.0 | 0.0 | 3.12 | 2.58 | 2.14 | 1.77 | 0.82 | 4.91 | 4.15 | 3.50 | 2.97 | 1.59 | 1.60 | 1.80 | 19.93 | 4.76 @ 75F |
| 1995 | 50.0 | 50.0 | 50.0 | 3.91 | 3.29 | 2.78 | 2.35 | 1.08 | 5.98 | 5.07 | 4.30 | 3.66 | 1.87 | 1.63 | 2.04 | 19.93 | 2.37 @100F |
| 1995 | 20.6 | 27.3 | 20.6 | 3.04 | 2.57 | 2.16 | 1.83 | 0.82 | 4.84 | 4.11 | 3.49 | 2.97 | 1.53 | 1.62 | 1.82 | 19.93 | |
| 2000 | 0.0 | 0.0 | 0.0 | 2.35 | 2.00 | 1.70 | 1.44 | 0.59 | 3.61 | 3.06 | 2.60 | 2.20 | 0.99 | 1.60 | 1.65 | 18.80 | |
| 2000 | 0.0 | 100.0 | 0.0 | 4.09 | 3.31 | 2.67 | 2.15 | 1.05 | 5.82 | 4.76 | 3.90 | 3.19 | 1.62 | 1.57 | 1.95 | 18.80 | 5.47 @ 0F |
| 2000 | 100.0 | 0.0 | 100.0 | 3.81 | 3.34 | 2.92 | 2.55 | 1.08 | 5.24 | 4.53 | 3.92 | 3.40 | 1.49 | 1.67 | 2.09 | 18.80 | 5.21 @ 25F |
| 2000 | 50.0 | 0.0 | 50.0 | 3.02 | 2.61 | 2.26 | 1.95 | 0.81 | 4.36 | 3.74 | 3.21 | 2.76 | 1.22 | 1.63 | 1.85 | 18.80 | 4.96 @ 50F |
| 2000 | 0.0 | 50.0 | 0.0 | 3.15 | 2.60 | 2.14 | 1.77 | 0.80 | 4.63 | 3.85 | 3.20 | 2.66 | 1.28 | 1.59 | 1.78 | 18.80 | 4.72 @ 75F |
| 2000 | 50.0 | 50.0 | 50.0 | 3.95 | 3.32 | 2.79 | 2.35 | 1.06 | 5.53 | 4.64 | 3.91 | 3.29 | 1.56 | 1.62 | 2.02 | 18.80 | 2.29 @100F |
| 2000 | 20.6 | 27.3 | 20.6 | 3.06 | 2.58 | 2.17 | 1.83 | 0.80 | 4.47 | 3.77 | 3.18 | 2.68 | 1.24 | 1.61 | 1.80 | 18.80 | |

TABLE 13 : NOx AT 5.0 MPH.

## TABLE 14

## LOW ALTITUDE

### NOx EMISSION FACTORS (GRAMS/MILE) AT 10.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | LDGV 0°F | 25°F | 50°F | 75°F | 100°F | LDGT 0°F | 25°F | 50°F | 75°F | 100°F | -LDDV- 0-100F | -LDDT- 0-100F | -HDDV- 0-100F | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 3.26 | 2.84 | 2.48 | 2.17 | 1.61 | 4.17 | 3.67 | 3.25 | 2.88 | 2.22 | 1.74 | 2.33 | 32.27 | |
| 1980 | 0.0 | 100.0 | 0.0 | 4.56 | 4.03 | 3.58 | 3.18 | 2.25 | 5.94 | 5.31 | 4.76 | 4.28 | 3.08 | 2.02 | 2.79 | 32.27 | 7.36 @ 0F |
| 1980 | 100.0 | 0.0 | 100.0 | 3.92 | 3.63 | 3.39 | 3.21 | 2.43 | 4.38 | 4.29 | 4.25 | 4.24 | 3.44 | 2.19 | 3.02 | 32.27 | 6.86 @ 25F |
| 1980 | 50.0 | 0.0 | 50.0 | 3.63 | 3.28 | 2.99 | 2.75 | 2.08 | 4.33 | 4.05 | 3.82 | 3.65 | 2.91 | 1.94 | 2.64 | 32.27 | 6.41 @ 50F |
| 1980 | 0.0 | 50.0 | 0.0 | 3.99 | 3.51 | 3.10 | 2.74 | 1.97 | 5.17 | 4.59 | 4.10 | 3.67 | 2.72 | 1.86 | 2.54 | 32.27 | 6.01 @ 75F |
| 1980 | 50.0 | 50.0 | 50.0 | 4.24 | 3.83 | 3.49 | 3.20 | 2.34 | 5.16 | 4.80 | 4.50 | 4.26 | 3.26 | 2.10 | 2.90 | 32.27 | 4.33 @100F |
| 1980 | 20.6 | 27.3 | 20.6 | 3.81 | 3.39 | 3.03 | 2.72 | 2.00 | 4.79 | 4.33 | 3.95 | 3.63 | 2.78 | 1.89 | 2.57 | 32.27 | |
| 1985 | 0.0 | 0.0 | 0.0 | 2.43 | 2.10 | 1.82 | 1.58 | 1.00 | 3.97 | 3.44 | 3.00 | 2.61 | 1.83 | 1.78 | 1.95 | 26.99 | |
| 1985 | 0.0 | 100.0 | 0.0 | 3.59 | 3.11 | 2.70 | 2.36 | 1.47 | 5.86 | 5.21 | 4.63 | 4.13 | 2.71 | 1.81 | 2.33 | 26.99 | 6.08 @ 0F |
| 1985 | 100.0 | 0.0 | 100.0 | 3.55 | 3.17 | 2.85 | 2.58 | 1.51 | 5.82 | 5.13 | 4.57 | 4.13 | 2.66 | 1.92 | 2.51 | 26.99 | 5.70 @ 25F |
| 1985 | 50.0 | 0.0 | 50.0 | 2.99 | 2.64 | 2.34 | 2.09 | 1.26 | 4.90 | 4.30 | 3.81 | 3.40 | 2.28 | 1.84 | 2.20 | 26.99 | 5.37 @ 50F |
| 1985 | 0.0 | 50.0 | 0.0 | 3.02 | 2.62 | 2.28 | 1.99 | 1.25 | 4.96 | 4.36 | 3.85 | 3.41 | 2.29 | 1.79 | 2.12 | 26.99 | 5.07 @ 75F |
| 1985 | 50.0 | 50.0 | 50.0 | 3.57 | 3.14 | 2.78 | 2.47 | 1.49 | 5.84 | 5.17 | 4.60 | 4.13 | 2.68 | 1.87 | 2.42 | 26.99 | 3.77 @100F |
| 1985 | 20.6 | 27.3 | 20.6 | 2.98 | 2.60 | 2.28 | 2.01 | 1.24 | 4.89 | 4.30 | 3.80 | 3.37 | 2.27 | 1.81 | 2.15 | 26.99 | |
| 1988 | 0.0 | 0.0 | 0.0 | 2.21 | 1.90 | 1.63 | 1.41 | 0.77 | 3.95 | 3.40 | 2.93 | 2.53 | 1.67 | 1.50 | 1.71 | 22.99 | |
| 1988 | 0.0 | 100.0 | 0.0 | 3.45 | 2.91 | 2.47 | 2.10 | 1.19 | 5.82 | 5.13 | 4.53 | 4.00 | 2.50 | 1.50 | 2.03 | 22.99 | 5.74 @ 0F |
| 1988 | 100.0 | 0.0 | 100.0 | 3.46 | 3.05 | 2.69 | 2.39 | 1.21 | 6.17 | 5.31 | 4.60 | 4.03 | 2.34 | 1.60 | 2.18 | 22.99 | 5.42 @ 25F |
| 1988 | 50.0 | 0.0 | 50.0 | 2.81 | 2.45 | 2.14 | 1.88 | 0.99 | 5.04 | 4.35 | 3.77 | 3.29 | 2.02 | 1.55 | 1.92 | 22.99 | 5.13 @ 50F |
| 1988 | 0.0 | 50.0 | 0.0 | 2.81 | 2.39 | 2.04 | 1.75 | 0.98 | 4.90 | 4.28 | 3.74 | 3.28 | 2.10 | 1.50 | 1.85 | 22.99 | 4.86 @ 75F |
| 1988 | 50.0 | 50.0 | 50.0 | 3.46 | 2.98 | 2.58 | 2.24 | 1.20 | 6.00 | 5.22 | 4.56 | 4.02 | 2.42 | 1.55 | 2.11 | 22.99 | 2.97 @100F |
| 1988 | 20.6 | 27.3 | 20.6 | 2.79 | 2.40 | 2.07 | 1.79 | 0.97 | 4.92 | 4.27 | 3.72 | 3.25 | 2.05 | 1.52 | 1.87 | 22.99 | |
| 1990 | 0.0 | 0.0 | 0.0 | 2.16 | 1.85 | 1.58 | 1.35 | 0.67 | 3.82 | 3.28 | 2.81 | 2.42 | 1.50 | 1.41 | 1.52 | 19.72 | |
| 1990 | 0.0 | 100.0 | 0.0 | 3.49 | 2.90 | 2.42 | 2.02 | 1.09 | 5.71 | 4.96 | 4.33 | 3.78 | 2.27 | 1.40 | 1.80 | 19.72 | 5.75 @ 0F |
| 1990 | 100.0 | 0.0 | 100.0 | 3.46 | 3.03 | 2.66 | 2.34 | 1.10 | 5.98 | 5.13 | 4.42 | 3.84 | 2.09 | 1.49 | 1.93 | 19.72 | 5.45 @ 25F |
| 1990 | 50.0 | 0.0 | 50.0 | 2.77 | 2.41 | 2.09 | 1.82 | 0.88 | 4.88 | 4.18 | 3.61 | 3.13 | 1.80 | 1.45 | 1.70 | 19.72 | 5.17 @ 50F |
| 1990 | 0.0 | 50.0 | 0.0 | 2.79 | 2.35 | 1.98 | 1.67 | 0.87 | 4.76 | 4.12 | 3.57 | 3.10 | 1.89 | 1.41 | 1.64 | 19.72 | 4.91 @ 75F |
| 1990 | 50.0 | 50.0 | 50.0 | 3.47 | 2.96 | 2.54 | 2.18 | 1.10 | 5.85 | 5.05 | 4.38 | 3.81 | 2.18 | 1.45 | 1.87 | 19.72 | 2.74 @100F |
| 1990 | 20.6 | 27.3 | 20.6 | 2.76 | 2.35 | 2.01 | 1.72 | 0.87 | 4.77 | 4.11 | 3.55 | 3.08 | 1.84 | 1.42 | 1.66 | 19.72 | |
| 1995 | 0.0 | 0.0 | 0.0 | 2.12 | 1.80 | 1.53 | 1.30 | 0.55 | 3.54 | 3.01 | 2.57 | 2.18 | 1.14 | 1.34 | 1.38 | 16.54 | |
| 1995 | 0.0 | 100.0 | 0.0 | 3.62 | 2.94 | 2.39 | 1.94 | 0.96 | 5.50 | 4.62 | 3.89 | 3.28 | 1.79 | 1.32 | 1.64 | 16.54 | 5.80 @ 0F |
| 1995 | 100.0 | 0.0 | 100.0 | 3.43 | 2.99 | 2.62 | 2.29 | 0.99 | 5.38 | 4.61 | 3.96 | 3.41 | 1.62 | 1.40 | 1.76 | 16.54 | 5.52 @ 25F |
| 1995 | 50.0 | 0.0 | 50.0 | 2.72 | 2.35 | 2.03 | 1.76 | 0.75 | 4.42 | 3.77 | 3.23 | 2.77 | 1.37 | 1.36 | 1.55 | 16.54 | 5.25 @ 50F |
| 1995 | 0.0 | 50.0 | 0.0 | 2.81 | 2.33 | 1.92 | 1.59 | 0.74 | 4.47 | 3.78 | 3.20 | 2.71 | 1.45 | 1.33 | 1.50 | 16.54 | 5.00 @ 75F |
| 1995 | 50.0 | 50.0 | 50.0 | 3.52 | 2.97 | 2.50 | 2.11 | 0.97 | 5.44 | 4.62 | 3.92 | 3.34 | 1.71 | 1.36 | 1.70 | 16.54 | 2.49 @100F |
| 1995 | 20.6 | 27.3 | 20.6 | 2.74 | 2.31 | 1.95 | 1.65 | 0.74 | 4.41 | 3.74 | 3.18 | 2.71 | 1.41 | 1.34 | 1.51 | 16.54 | |
| 2000 | 0.0 | 0.0 | 0.0 | 2.11 | 1.79 | 1.53 | 1.30 | 0.53 | 3.25 | 2.76 | 2.34 | 1.99 | 0.89 | 1.33 | 1.37 | 15.60 | |
| 2000 | 0.0 | 100.0 | 0.0 | 3.68 | 2.97 | 2.40 | 1.94 | 0.94 | 5.25 | 4.29 | 3.52 | 2.88 | 1.46 | 1.31 | 1.62 | 15.60 | 5.75 @ 0F |
| 2000 | 100.0 | 0.0 | 100.0 | 3.43 | 3.00 | 2.62 | 2.29 | 0.97 | 4.73 | 4.09 | 3.54 | 3.06 | 1.35 | 1.38 | 1.73 | 15.60 | 5.47 @ 25F |
| 2000 | 50.0 | 0.0 | 50.0 | 2.72 | 2.35 | 2.03 | 1.76 | 0.73 | 3.94 | 3.38 | 2.90 | 2.49 | 1.10 | 1.35 | 1.53 | 15.60 | 5.21 @ 50F |
| 2000 | 0.0 | 50.0 | 0.0 | 2.84 | 2.34 | 1.93 | 1.59 | 0.72 | 4.18 | 3.47 | 2.89 | 2.40 | 1.16 | 1.32 | 1.48 | 15.60 | 4.96 @ 75F |
| 2000 | 50.0 | 50.0 | 50.0 | 3.56 | 2.99 | 2.51 | 2.11 | 0.96 | 4.99 | 4.19 | 3.53 | 2.97 | 1.41 | 1.34 | 1.67 | 15.60 | 2.41 @100F |
| 2000 | 20.6 | 27.3 | 20.6 | 2.75 | 2.32 | 1.95 | 1.64 | 0.72 | 4.04 | 3.40 | 2.87 | 2.42 | 1.12 | 1.33 | 1.49 | 15.60 | |

TABLE 14 : NOx AT 10.0 MPH.

## TABLE 15

## LOW ALTITUDE

## NOx EMISSION FACTORS (GRAMS/MILE) AT 19.6 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | LDGV | | | | | LDGT | | | | | -LDDV- | -LDDT- | -HDDV- | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0°F | 25°F | 50°F | 75°F | 100°F | 0°F | 25°F | 50°F | 75°F | 100°F | 0-100F | 0-100F | 0-100F | |
| 1980 | 0.0 | 0.0 | 0.0 | 3.44 | 3.01 | 2.64 | 2.33 | 1.74 | 4.43 | 3.93 | 3.49 | 3.12 | 2.41 | 1.34 | 1.80 | 24.91 | 8.04 @ 0F |
| 1980 | 0.0 | 100.0 | 0.0 | 4.78 | 4.25 | 3.78 | 3.38 | 2.40 | 6.31 | 5.67 | 5.10 | 4.61 | 3.34 | 1.56 | 2.15 | 24.91 | 7.49 @ 25F |
| 1980 | 100.0 | 0.0 | 100.0 | 4.06 | 3.78 | 3.57 | 3.40 | 2.59 | 4.61 | 4.56 | 4.54 | 4.56 | 3.69 | 1.69 | 2.33 | 24.91 | 7.00 @ 50F |
| 1980 | 50.0 | 0.0 | 50.0 | 3.80 | 3.45 | 3.17 | 2.93 | 2.23 | 4.58 | 4.32 | 4.10 | 3.94 | 3.14 | 1.50 | 2.04 | 24.91 | 6.56 @ 75F |
| 1980 | 0.0 | 50.0 | 0.0 | 4.21 | 3.71 | 3.29 | 2.92 | 2.12 | 5.50 | 4.91 | 4.41 | 3.97 | 2.95 | 1.44 | 1.96 | 24.91 | 4.73 @100F |
| 1980 | 50.0 | 50.0 | 50.0 | 4.42 | 4.01 | 3.67 | 3.39 | 2.50 | 5.46 | 5.11 | 4.82 | 4.59 | 3.51 | 1.62 | 2.24 | 24.91 | |
| 1980 | 20.6 | 27.3 | 20.6 | 4.01 | 3.58 | 3.21 | 2.90 | 2.15 | 5.08 | 4.63 | 4.25 | 3.92 | 3.01 | 1.46 | 1.98 | 24.91 | |
| 1985 | 0.0 | 0.0 | 0.0 | 2.39 | 2.07 | 1.81 | 1.58 | 1.02 | 3.89 | 3.40 | 2.97 | 2.61 | 1.85 | 1.37 | 1.51 | 20.83 | 6.65 @ 0F |
| 1985 | 0.0 | 100.0 | 0.0 | 3.48 | 3.04 | 2.66 | 2.34 | 1.48 | 5.75 | 5.13 | 4.59 | 4.11 | 2.72 | 1.39 | 1.80 | 20.83 | 6.23 @ 25F |
| 1985 | 100.0 | 0.0 | 100.0 | 3.39 | 3.05 | 2.76 | 2.52 | 1.51 | 5.56 | 4.96 | 4.47 | 4.09 | 2.69 | 1.49 | 1.94 | 20.83 | 5.87 @ 50F |
| 1985 | 50.0 | 0.0 | 50.0 | 2.89 | 2.57 | 2.29 | 2.06 | 1.29 | 4.74 | 4.20 | 3.75 | 3.39 | 2.31 | 1.42 | 1.70 | 20.83 | 5.54 @ 75F |
| 1985 | 0.0 | 50.0 | 0.0 | 2.96 | 2.58 | 2.26 | 1.98 | 1.27 | 4.87 | 4.31 | 3.82 | 3.40 | 2.32 | 1.38 | 1.64 | 20.83 | 4.12 @100F |
| 1985 | 50.0 | 50.0 | 50.0 | 3.44 | 3.04 | 2.71 | 2.43 | 1.50 | 5.65 | 5.04 | 4.53 | 4.10 | 2.71 | 1.44 | 1.87 | 20.83 | |
| 1985 | 20.6 | 27.3 | 20.6 | 2.91 | 2.55 | 2.25 | 2.00 | 1.27 | 4.78 | 4.23 | 3.76 | 3.37 | 2.30 | 1.40 | 1.66 | 20.83 | |
| 1988 | 0.0 | 0.0 | 0.0 | 2.06 | 1.77 | 1.53 | 1.32 | 0.75 | 3.74 | 3.23 | 2.80 | 2.43 | 1.63 | 1.16 | 1.32 | 17.74 | 6.27 @ 0F |
| 1988 | 0.0 | 100.0 | 0.0 | 3.17 | 2.69 | 2.30 | 1.97 | 1.14 | 5.51 | 4.88 | 4.32 | 3.84 | 2.43 | 1.16 | 1.57 | 17.74 | 5.92 @ 25F |
| 1988 | 100.0 | 0.0 | 100.0 | 3.16 | 2.79 | 2.48 | 2.21 | 1.15 | 5.73 | 4.97 | 4.35 | 3.85 | 2.29 | 1.23 | 1.68 | 17.74 | 5.61 @ 50F |
| 1988 | 50.0 | 0.0 | 50.0 | 2.59 | 2.27 | 1.99 | 1.76 | 0.95 | 4.72 | 4.10 | 3.58 | 3.15 | 1.98 | 1.19 | 1.48 | 17.74 | 5.31 @ 75F |
| 1988 | 0.0 | 50.0 | 0.0 | 2.60 | 2.23 | 1.91 | 1.65 | 0.95 | 4.64 | 4.07 | 3.58 | 3.15 | 2.04 | 1.16 | 1.43 | 17.74 | 3.25 @100F |
| 1988 | 50.0 | 50.0 | 50.0 | 3.16 | 2.74 | 2.39 | 2.09 | 1.15 | 5.62 | 4.92 | 4.33 | 3.84 | 2.36 | 1.20 | 1.63 | 17.74 | |
| 1988 | 20.6 | 27.3 | 20.6 | 2.58 | 2.23 | 1.93 | 1.68 | 0.94 | 4.64 | 4.05 | 3.55 | 3.12 | 2.00 | 1.17 | 1.45 | 17.74 | |
| 1990 | 0.0 | 0.0 | 0.0 | 1.95 | 1.67 | 1.43 | 1.23 | 0.63 | 3.54 | 3.04 | 2.62 | 2.27 | 1.43 | 1.09 | 1.17 | 15.22 | 6.29 @ 0F |
| 1990 | 0.0 | 100.0 | 0.0 | 3.11 | 2.60 | 2.17 | 1.83 | 1.00 | 5.28 | 4.61 | 4.04 | 3.54 | 2.16 | 1.08 | 1.39 | 15.22 | 5.95 @ 25F |
| 1990 | 100.0 | 0.0 | 100.0 | 3.08 | 2.70 | 2.37 | 2.09 | 1.01 | 5.46 | 4.71 | 4.09 | 3.58 | 1.99 | 1.15 | 1.49 | 15.22 | 5.65 @ 50F |
| 1990 | 50.0 | 0.0 | 50.0 | 2.49 | 2.16 | 1.88 | 1.64 | 0.81 | 4.48 | 3.86 | 3.35 | 2.93 | 1.72 | 1.12 | 1.32 | 15.22 | 5.36 @ 75F |
| 1990 | 0.0 | 50.0 | 0.0 | 2.50 | 2.11 | 1.79 | 1.52 | 0.81 | 4.41 | 3.83 | 3.33 | 2.91 | 1.80 | 1.09 | 1.27 | 15.22 | 3.00 @100F |
| 1990 | 50.0 | 50.0 | 50.0 | 3.09 | 2.65 | 2.27 | 1.96 | 1.00 | 5.37 | 4.66 | 4.06 | 3.56 | 2.08 | 1.12 | 1.44 | 15.22 | |
| 1990 | 20.6 | 27.3 | 20.6 | 2.47 | 2.11 | 1.81 | 1.56 | 0.80 | 4.40 | 3.81 | 3.31 | 2.89 | 1.75 | 1.10 | 1.28 | 15.22 | |
| 1995 | 0.0 | 0.0 | 0.0 | 1.82 | 1.55 | 1.32 | 1.12 | 0.48 | 3.13 | 2.67 | 2.27 | 1.94 | 1.02 | 1.03 | 1.07 | 12.76 | 6.33 @ 0F |
| 1995 | 0.0 | 100.0 | 0.0 | 3.11 | 2.53 | 2.05 | 1.67 | 0.83 | 4.85 | 4.08 | 3.45 | 2.92 | 1.61 | 1.02 | 1.26 | 12.76 | 6.03 @ 25F |
| 1995 | 100.0 | 0.0 | 100.0 | 2.95 | 2.58 | 2.25 | 1.97 | 0.85 | 4.74 | 4.07 | 3.50 | 3.02 | 1.45 | 1.08 | 1.35 | 12.76 | 5.74 @ 50F |
| 1995 | 50.0 | 0.0 | 50.0 | 2.34 | 2.03 | 1.75 | 1.51 | 0.65 | 3.90 | 3.33 | 2.86 | 2.45 | 1.23 | 1.05 | 1.20 | 12.76 | 5.46 @ 75F |
| 1995 | 0.0 | 50.0 | 0.0 | 2.42 | 2.00 | 1.66 | 1.38 | 0.64 | 3.95 | 3.34 | 2.83 | 2.41 | 1.31 | 1.02 | 1.15 | 12.76 | 2.73 @100F |
| 1995 | 50.0 | 50.0 | 50.0 | 3.03 | 2.55 | 2.15 | 1.82 | 0.84 | 4.80 | 4.08 | 3.47 | 2.97 | 1.53 | 1.05 | 1.31 | 12.76 | |
| 1995 | 20.6 | 27.3 | 20.6 | 2.36 | 1.99 | 1.68 | 1.42 | 0.64 | 3.89 | 3.31 | 2.82 | 2.41 | 1.26 | 1.03 | 1.17 | 12.76 | |
| 2000 | 0.0 | 0.0 | 0.0 | 1.80 | 1.53 | 1.30 | 1.11 | 0.45 | 2.81 | 2.38 | 2.02 | 1.71 | 0.77 | 1.03 | 1.05 | 12.04 | 6.28 @ 0F |
| 2000 | 0.0 | 100.0 | 0.0 | 3.15 | 2.54 | 2.05 | 1.66 | 0.81 | 4.52 | 3.70 | 3.03 | 2.49 | 1.26 | 1.01 | 1.25 | 12.04 | 5.98 @ 25F |
| 2000 | 100.0 | 0.0 | 100.0 | 2.93 | 2.56 | 2.24 | 1.96 | 0.83 | 4.08 | 3.53 | 3.05 | 2.64 | 1.16 | 1.07 | 1.34 | 12.04 | 5.69 @ 50F |
| 2000 | 50.0 | 0.0 | 50.0 | 2.32 | 2.01 | 1.74 | 1.50 | 0.63 | 3.40 | 2.91 | 2.50 | 2.14 | 0.95 | 1.04 | 1.18 | 12.04 | 5.42 @ 75F |
| 2000 | 0.0 | 50.0 | 0.0 | 2.42 | 2.00 | 1.65 | 1.36 | 0.61 | 3.60 | 2.99 | 2.49 | 2.07 | 1.00 | 1.02 | 1.14 | 12.04 | 2.63 @100F |
| 2000 | 50.0 | 50.0 | 50.0 | 3.04 | 2.55 | 2.15 | 1.81 | 0.82 | 4.30 | 3.61 | 3.04 | 2.56 | 1.21 | 1.04 | 1.29 | 12.04 | |
| 2000 | 20.6 | 27.3 | 20.6 | 2.35 | 1.98 | 1.67 | 1.41 | 0.61 | 3.48 | 2.93 | 2.47 | 2.09 | 0.97 | 1.03 | 1.15 | 12.04 | |

TABLE 15 : NOx AT 19.6 MPH.

TABLE 16

LOW ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 35.0 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | LDGV | | | | | LDGT | | | | | -LDDV- | -LDDT- | -HDDV- | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0°F | 25°F | 50°F | 75°F | 100°F | 0°F | 25°F | 50°F | 75°F | 100°F | 0-100F | 0-100F | 0-100F | |
| 1980 | 0.0 | 0.0 | 0.0 | 3.99 | 3.50 | 3.08 | 2.72 | 2.04 | 5.14 | 4.56 | 4.07 | 3.64 | 2.83 | 1.16 | 1.56 | 21.60 | 9.14 @ 0F |
| 1980 | 0.0 | 100.0 | 0.0 | 5.50 | 4.89 | 4.37 | 3.91 | 2.80 | 7.26 | 6.53 | 5.90 | 5.34 | 3.89 | 1.36 | 1.87 | 21.60 | 8.51 @ 25F |
| 1980 | 100.0 | 0.0 | 100.0 | 4.60 | 4.32 | 4.09 | 3.92 | 3.03 | 5.27 | 5.24 | 5.25 | 5.29 | 4.31 | 1.46 | 2.02 | 21.60 | 7.95 @ 50F |
| 1980 | 50.0 | 0.0 | 50.0 | 4.36 | 3.98 | 3.67 | 3.40 | 2.61 | 5.28 | 4.99 | 4.76 | 4.59 | 3.68 | 1.30 | 1.77 | 21.60 | 7.46 @ 75F |
| 1980 | 0.0 | 50.0 | 0.0 | 4.86 | 4.30 | 3.82 | 3.40 | 2.48 | 6.35 | 5.69 | 5.11 | 4.61 | 3.44 | 1.25 | 1.70 | 21.60 | 5.37 @100F |
| 1980 | 50.0 | 50.0 | 50.0 | 5.05 | 4.60 | 4.23 | 3.92 | 2.91 | 6.26 | 5.88 | 5.57 | 5.32 | 4.10 | 1.41 | 1.94 | 21.60 | |
| 1980 | 20.6 | 27.3 | 20.6 | 4.62 | 4.14 | 3.73 | 3.38 | 2.52 | 5.86 | 5.36 | 4.93 | 4.57 | 3.52 | 1.26 | 1.72 | 21.60 | |
| 1985 | 0.0 | 0.0 | 0.0 | 2.56 | 2.23 | 1.95 | 1.71 | 1.14 | 4.16 | 3.64 | 3.20 | 2.83 | 2.03 | 1.19 | 1.31 | 18.07 | 7.55 @ 0F |
| 1985 | 0.0 | 100.0 | 0.0 | 3.68 | 3.23 | 2.84 | 2.51 | 1.63 | 6.12 | 5.48 | 4.91 | 4.42 | 2.97 | 1.21 | 1.56 | 18.07 | 7.08 @ 25F |
| 1985 | 100.0 | 0.0 | 100.0 | 3.51 | 3.18 | 2.90 | 2.66 | 1.66 | 5.78 | 5.20 | 4.75 | 4.40 | 2.95 | 1.29 | 1.68 | 18.07 | 6.66 @ 50F |
| 1985 | 50.0 | 0.0 | 50.0 | 3.05 | 2.72 | 2.45 | 2.21 | 1.42 | 4.98 | 4.45 | 4.02 | 3.66 | 2.54 | 1.23 | 1.47 | 18.07 | 6.30 @ 75F |
| 1985 | 0.0 | 50.0 | 0.0 | 3.15 | 2.76 | 2.43 | 2.15 | 1.41 | 5.20 | 4.62 | 4.11 | 3.68 | 2.54 | 1.20 | 1.42 | 18.07 | 4.68 @100F |
| 1985 | 50.0 | 50.0 | 50.0 | 3.60 | 3.20 | 2.87 | 2.59 | 1.64 | 5.95 | 5.34 | 4.83 | 4.41 | 2.96 | 1.25 | 1.62 | 18.07 | |
| 1985 | 20.6 | 27.3 | 20.6 | 3.09 | 2.72 | 2.42 | 2.16 | 1.40 | 5.07 | 4.51 | 4.04 | 3.64 | 2.52 | 1.21 | 1.44 | 18.07 | |
| 1988 | 0.0 | 0.0 | 0.0 | 2.06 | 1.78 | 1.54 | 1.34 | 0.78 | 3.84 | 3.34 | 2.90 | 2.54 | 1.72 | 1.01 | 1.14 | 15.39 | 7.13 @ 0F |
| 1988 | 0.0 | 100.0 | 0.0 | 3.12 | 2.67 | 2.29 | 1.98 | 1.18 | 5.66 | 5.03 | 4.47 | 3.99 | 2.56 | 1.01 | 1.36 | 15.39 | 6.73 @ 25F |
| 1988 | 100.0 | 0.0 | 100.0 | 3.09 | 2.74 | 2.44 | 2.19 | 1.18 | 5.78 | 5.05 | 4.46 | 3.98 | 2.42 | 1.07 | 1.46 | 15.39 | 6.37 @ 50F |
| 1988 | 50.0 | 0.0 | 50.0 | 2.57 | 2.25 | 1.99 | 1.76 | 0.99 | 4.81 | 4.20 | 3.70 | 3.28 | 2.09 | 1.03 | 1.29 | 15.39 | 6.04 @ 75F |
| 1988 | 0.0 | 50.0 | 0.0 | 2.59 | 2.23 | 1.93 | 1.67 | 0.99 | 4.78 | 4.21 | 3.72 | 3.29 | 2.16 | 1.01 | 1.24 | 15.39 | 3.69 @100F |
| 1988 | 50.0 | 50.0 | 50.0 | 3.10 | 2.70 | 2.37 | 2.09 | 1.18 | 5.72 | 5.04 | 4.47 | 3.99 | 2.49 | 1.04 | 1.41 | 15.39 | |
| 1988 | 20.6 | 27.3 | 20.6 | 2.56 | 2.22 | 1.94 | 1.69 | 0.98 | 4.75 | 4.17 | 3.67 | 3.25 | 2.11 | 1.02 | 1.25 | 15.39 | |
| 1990 | 0.0 | 0.0 | 0.0 | 1.87 | 1.61 | 1.38 | 1.19 | 0.63 | 3.54 | 3.06 | 2.65 | 2.30 | 1.47 | 0.95 | 1.02 | 13.21 | 7.14 @ 0F |
| 1990 | 0.0 | 100.0 | 0.0 | 2.94 | 2.47 | 2.08 | 1.76 | 0.98 | 5.28 | 4.63 | 4.07 | 3.59 | 2.22 | 0.94 | 1.20 | 13.21 | 6.76 @ 25F |
| 1990 | 100.0 | 0.0 | 100.0 | 2.91 | 2.55 | 2.25 | 1.99 | 0.99 | 5.39 | 4.68 | 4.09 | 3.61 | 2.05 | 1.00 | 1.29 | 13.21 | 6.41 @ 50F |
| 1990 | 50.0 | 0.0 | 50.0 | 2.37 | 2.06 | 1.80 | 1.58 | 0.81 | 4.45 | 3.86 | 3.37 | 2.96 | 1.78 | 0.97 | 1.14 | 13.21 | 6.09 @ 75F |
| 1990 | 0.0 | 50.0 | 0.0 | 2.39 | 2.03 | 1.73 | 1.47 | 0.81 | 4.41 | 3.85 | 3.37 | 2.96 | 1.86 | 0.94 | 1.10 | 13.21 | 3.41 @100F |
| 1990 | 50.0 | 50.0 | 50.0 | 2.92 | 2.51 | 2.17 | 1.88 | 0.99 | 5.34 | 4.65 | 4.08 | 3.60 | 2.13 | 0.97 | 1.25 | 13.21 | |
| 1990 | 20.6 | 27.3 | 20.6 | 2.36 | 2.02 | 1.74 | 1.50 | 0.80 | 4.39 | 3.82 | 3.34 | 2.93 | 1.81 | 0.95 | 1.11 | 13.21 | |
| 1995 | 0.0 | 0.0 | 0.0 | 1.64 | 1.39 | 1.19 | 1.01 | 0.43 | 2.95 | 2.51 | 2.15 | 1.83 | 0.99 | 0.89 | 0.93 | 11.07 | 7.20 @ 0F |
| 1995 | 0.0 | 100.0 | 0.0 | 2.78 | 2.26 | 1.84 | 1.50 | 0.75 | 4.55 | 3.84 | 3.26 | 2.77 | 1.54 | 0.88 | 1.10 | 11.07 | 6.85 @ 25F |
| 1995 | 100.0 | 0.0 | 100.0 | 2.64 | 2.31 | 2.02 | 1.77 | 0.77 | 4.45 | 3.82 | 3.29 | 2.85 | 1.39 | 0.93 | 1.18 | 11.07 | 6.52 @ 50F |
| 1995 | 50.0 | 0.0 | 50.0 | 2.10 | 1.82 | 1.57 | 1.36 | 0.59 | 3.67 | 3.14 | 2.70 | 2.32 | 1.18 | 0.91 | 1.04 | 11.07 | 6.21 @ 75F |
| 1995 | 0.0 | 50.0 | 0.0 | 2.17 | 1.80 | 1.49 | 1.24 | 0.58 | 3.71 | 3.15 | 2.68 | 2.29 | 1.26 | 0.89 | 1.00 | 11.07 | 3.10 @100F |
| 1995 | 50.0 | 50.0 | 50.0 | 2.71 | 2.29 | 1.93 | 1.63 | 0.76 | 4.50 | 3.83 | 3.27 | 2.81 | 1.47 | 0.91 | 1.14 | 11.07 | |
| 1995 | 20.6 | 27.3 | 20.6 | 2.12 | 1.79 | 1.51 | 1.28 | 0.58 | 3.66 | 3.12 | 2.66 | 2.28 | 1.22 | 0.90 | 1.01 | 11.07 | |
| 2000 | 0.0 | 0.0 | 0.0 | 1.60 | 1.36 | 1.15 | 0.98 | 0.40 | 2.53 | 2.15 | 1.83 | 1.55 | 0.70 | 0.89 | 0.92 | 10.44 | 7.14 @ 0F |
| 2000 | 0.0 | 100.0 | 0.0 | 2.79 | 2.25 | 1.82 | 1.47 | 0.71 | 4.07 | 3.34 | 2.74 | 2.25 | 1.15 | 0.87 | 1.08 | 10.44 | 6.79 @ 25F |
| 2000 | 100.0 | 0.0 | 100.0 | 2.60 | 2.27 | 1.98 | 1.74 | 0.73 | 3.69 | 3.18 | 2.75 | 2.38 | 1.05 | 0.93 | 1.16 | 10.44 | 6.47 @ 50F |
| 2000 | 50.0 | 0.0 | 50.0 | 2.06 | 1.78 | 1.54 | 1.33 | 0.55 | 3.07 | 2.63 | 2.26 | 1.93 | 0.86 | 0.91 | 1.03 | 10.44 | 6.16 @ 75F |
| 2000 | 0.0 | 50.0 | 0.0 | 2.15 | 1.77 | 1.46 | 1.20 | 0.54 | 3.25 | 2.70 | 2.25 | 1.87 | 0.91 | 0.88 | 0.99 | 10.44 | 2.99 @100F |
| 2000 | 50.0 | 50.0 | 50.0 | 2.69 | 2.26 | 1.90 | 1.60 | 0.72 | 3.88 | 3.26 | 2.75 | 2.31 | 1.10 | 0.90 | 1.12 | 10.44 | |
| 2000 | 20.6 | 27.3 | 20.6 | 2.08 | 1.75 | 1.48 | 1.24 | 0.54 | 3.14 | 2.65 | 2.23 | 1.88 | 0.88 | 0.89 | 1.00 | 10.44 | |

TABLE 16 : NOx AT 35.0 MPH.

# TABLE 17

## LOW ALTITUDE

### NOx EMISSION FACTORS (GRAMS/MILE) AT 50.0 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | LDGV | | | | | LDGT | | | | | -LDDV- | -LDDT- | -HDDV- | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0°F | 25°F | 50°F | 75°F | 100°F | 0°F | 25°F | 50°F | 75°F | 100°F | 0-100F | 0-100F | 0-100F | |
| 1980 | 0.0 | 0.0 | 0.0 | 4.42 | 3.88 | 3.41 | 3.01 | 2.26 | 5.64 | 5.01 | 4.47 | 4.01 | 3.11 | 1.40 | 1.88 | 26.00 | |
| 1980 | 0.0 | 100.0 | 0.0 | 6.09 | 5.42 | 4.84 | 4.34 | 3.10 | 7.97 | 7.17 | 6.48 | 5.88 | 4.27 | 1.63 | 2.25 | 26.00 | 10.20 ● 0F |
| 1980 | 100.0 | 0.0 | 100.0 | 5.13 | 4.81 | 4.55 | 4.35 | 3.35 | 5.81 | 5.77 | 5.78 | 5.82 | 4.73 | 1.76 | 2.43 | 26.00 | 9.50 ● 25F |
| 1980 | 50.0 | 0.0 | 50.0 | 4.85 | 4.42 | 4.07 | 3.78 | 2.89 | 5.81 | 5.49 | 5.24 | 5.05 | 4.04 | 1.56 | 2.13 | 26.00 | 8.88 ● 50F |
| 1980 | 0.0 | 50.0 | 0.0 | 5.39 | 4.77 | 4.23 | 3.77 | 2.75 | 6.98 | 6.25 | 5.62 | 5.08 | 3.79 | 1.50 | 2.05 | 26.00 | 8.33 ● 75F |
| 1980 | 50.0 | 50.0 | 50.0 | 5.61 | 5.11 | 4.70 | 4.34 | 3.23 | 6.89 | 6.47 | 6.13 | 5.85 | 4.50 | 1.70 | 2.34 | 26.00 | 6.00 ●100F |
| 1980 | 20.6 | 27.3 | 20.6 | 5.13 | 4.59 | 4.13 | 3.75 | 2.79 | 6.45 | 5.89 | 5.42 | 5.02 | 3.87 | 1.52 | 2.07 | 26.00 | |
| 1985 | 0.0 | 0.0 | 0.0 | 2.84 | 2.48 | 2.17 | 1.90 | 1.27 | 4.68 | 4.10 | 3.61 | 3.18 | 2.28 | 1.43 | 1.57 | 21.74 | |
| 1985 | 0.0 | 100.0 | 0.0 | 4.07 | 3.57 | 3.15 | 2.79 | 1.81 | 6.89 | 6.16 | 5.53 | 4.98 | 3.33 | 1.46 | 1.87 | 21.74 | 8.43 ● 0F |
| 1985 | 100.0 | 0.0 | 100.0 | 3.89 | 3.52 | 3.21 | 2.95 | 1.84 | 6.57 | 5.90 | 5.37 | 4.95 | 3.31 | 1.55 | 2.02 | 21.74 | 7.91 ● 25F |
| 1985 | 50.0 | 0.0 | 50.0 | 3.38 | 3.02 | 2.71 | 2.45 | 1.58 | 5.64 | 5.03 | 4.53 | 4.12 | 2.84 | 1.48 | 1.77 | 21.74 | 7.44 ● 50F |
| 1985 | 0.0 | 50.0 | 0.0 | 3.49 | 3.06 | 2.70 | 2.38 | 1.57 | 5.85 | 5.20 | 4.63 | 4.14 | 2.85 | 1.44 | 1.71 | 21.74 | 7.03 ● 75F |
| 1985 | 50.0 | 50.0 | 50.0 | 3.98 | 3.55 | 3.18 | 2.87 | 1.83 | 6.73 | 6.03 | 5.45 | 4.96 | 3.32 | 1.50 | 1.95 | 21.74 | 5.22 ●100F |
| 1985 | 20.6 | 27.3 | 20.6 | 3.42 | 3.02 | 2.68 | 2.39 | 1.56 | 5.72 | 5.09 | 4.55 | 4.09 | 2.82 | 1.46 | 1.73 | 21.74 | |
| 1988 | 0.0 | 0.0 | 0.0 | 2.26 | 1.95 | 1.69 | 1.47 | 0.87 | 4.39 | 3.81 | 3.31 | 2.89 | 1.96 | 1.21 | 1.38 | 18.52 | |
| 1988 | 0.0 | 100.0 | 0.0 | 3.40 | 2.91 | 2.51 | 2.17 | 1.30 | 6.46 | 5.74 | 5.10 | 4.55 | 2.91 | 1.21 | 1.63 | 18.52 | 7.96 ● 0F |
| 1988 | 100.0 | 0.0 | 100.0 | 3.36 | 2.98 | 2.66 | 2.39 | 1.29 | 6.64 | 5.79 | 5.10 | 4.54 | 2.74 | 1.29 | 1.76 | 18.52 | 7.51 ● 25F |
| 1988 | 50.0 | 0.0 | 50.0 | 2.80 | 2.46 | 2.17 | 1.93 | 1.09 | 5.51 | 4.81 | 4.22 | 3.74 | 2.38 | 1.25 | 1.55 | 18.52 | 7.11 ● 50F |
| 1988 | 0.0 | 50.0 | 0.0 | 2.83 | 2.44 | 2.11 | 1.83 | 1.09 | 5.46 | 4.80 | 4.24 | 3.75 | 2.46 | 1.21 | 1.49 | 18.52 | 6.74 ● 75F |
| 1988 | 50.0 | 50.0 | 50.0 | 3.38 | 2.95 | 2.58 | 2.28 | 1.30 | 6.55 | 5.76 | 5.10 | 4.54 | 2.83 | 1.25 | 1.70 | 18.52 | 4.12 ●100F |
| 1988 | 20.6 | 27.3 | 20.6 | 2.79 | 2.43 | 2.12 | 1.86 | 1.08 | 5.44 | 4.76 | 4.19 | 3.71 | 2.40 | 1.22 | 1.51 | 18.52 | |
| 1990 | 0.0 | 0.0 | 0.0 | 2.02 | 1.74 | 1.49 | 1.29 | 0.69 | 4.02 | 3.47 | 3.01 | 2.61 | 1.68 | 1.14 | 1.22 | 15.89 | |
| 1990 | 0.0 | 100.0 | 0.0 | 3.16 | 2.66 | 2.25 | 1.91 | 1.07 | 5.98 | 5.25 | 4.62 | 4.07 | 2.52 | 1.13 | 1.45 | 15.89 | 7.97 ● 0F |
| 1990 | 100.0 | 0.0 | 100.0 | 3.12 | 2.75 | 2.42 | 2.15 | 1.07 | 6.14 | 5.32 | 4.64 | 4.08 | 2.32 | 1.20 | 1.56 | 15.89 | 7.55 ● 25F |
| 1990 | 50.0 | 0.0 | 50.0 | 2.55 | 2.22 | 1.94 | 1.70 | 0.88 | 5.07 | 4.39 | 3.82 | 3.35 | 2.01 | 1.17 | 1.37 | 15.89 | 7.16 ● 50F |
| 1990 | 0.0 | 50.0 | 0.0 | 2.58 | 2.19 | 1.86 | 1.59 | 0.88 | 5.01 | 4.37 | 3.82 | 3.35 | 2.11 | 1.13 | 1.32 | 15.89 | 6.80 ● 75F |
| 1990 | 50.0 | 50.0 | 50.0 | 3.14 | 2.70 | 2.34 | 2.03 | 1.07 | 6.06 | 5.28 | 4.63 | 4.08 | 2.42 | 1.17 | 1.50 | 15.89 | 3.80 ●100F |
| 1990 | 20.6 | 27.3 | 20.6 | 2.54 | 2.18 | 1.88 | 1.63 | 0.87 | 4.99 | 4.34 | 3.79 | 3.32 | 2.05 | 1.15 | 1.34 | 15.89 | |
| 1995 | 0.0 | 0.0 | 0.0 | 1.72 | 1.46 | 1.24 | 1.06 | 0.46 | 3.26 | 2.78 | 2.37 | 2.02 | 1.10 | 1.08 | 1.11 | 13.33 | |
| 1995 | 0.0 | 100.0 | 0.0 | 2.91 | 2.37 | 1.93 | 1.57 | 0.79 | 5.00 | 4.24 | 3.60 | 3.06 | 1.72 | 1.06 | 1.32 | 13.33 | 8.03 ● 0F |
| 1995 | 100.0 | 0.0 | 100.0 | 2.76 | 2.41 | 2.11 | 1.85 | 0.80 | 4.93 | 4.22 | 3.63 | 3.13 | 1.54 | 1.12 | 1.41 | 13.33 | 7.65 ● 25F |
| 1995 | 50.0 | 0.0 | 50.0 | 2.20 | 1.90 | 1.64 | 1.42 | 0.62 | 4.05 | 3.47 | 2.98 | 2.56 | 1.32 | 1.10 | 1.25 | 13.33 | 7.28 ● 50F |
| 1995 | 0.0 | 50.0 | 0.0 | 2.27 | 1.88 | 1.56 | 1.30 | 0.61 | 4.09 | 3.48 | 2.96 | 2.53 | 1.40 | 1.07 | 1.21 | 13.33 | 6.93 ● 75F |
| 1995 | 50.0 | 50.0 | 50.0 | 2.83 | 2.39 | 2.02 | 1.71 | 0.80 | 4.96 | 4.23 | 3.61 | 3.10 | 1.63 | 1.09 | 1.37 | 13.33 | 3.46 ●100F |
| 1995 | 20.6 | 27.3 | 20.6 | 2.22 | 1.87 | 1.58 | 1.34 | 0.61 | 4.04 | 3.44 | 2.94 | 2.52 | 1.35 | 1.08 | 1.22 | 13.33 | |
| 2000 | 0.0 | 0.0 | 0.0 | 1.65 | 1.41 | 1.20 | 1.02 | 0.41 | 2.70 | 2.29 | 1.95 | 1.65 | 0.76 | 1.07 | 1.10 | 12.57 | |
| 2000 | 0.0 | 100.0 | 0.0 | 2.89 | 2.33 | 1.88 | 1.52 | 0.74 | 4.33 | 3.55 | 2.92 | 2.40 | 1.23 | 1.05 | 1.30 | 12.57 | 7.97 ● 0F |
| 2000 | 100.0 | 0.0 | 100.0 | 2.69 | 2.35 | 2.06 | 1.80 | 0.76 | 3.94 | 3.40 | 2.93 | 2.53 | 1.12 | 1.11 | 1.40 | 12.57 | 7.59 ● 25F |
| 2000 | 50.0 | 0.0 | 50.0 | 2.13 | 1.84 | 1.59 | 1.38 | 0.57 | 3.28 | 2.81 | 2.40 | 2.06 | 0.93 | 1.09 | 1.23 | 12.57 | 7.22 ● 50F |
| 2000 | 0.0 | 50.0 | 0.0 | 2.22 | 1.83 | 1.51 | 1.25 | 0.56 | 3.46 | 2.88 | 2.40 | 2.00 | 0.98 | 1.06 | 1.19 | 12.57 | 6.88 ● 75F |
| 2000 | 50.0 | 50.0 | 50.0 | 2.79 | 2.34 | 1.97 | 1.66 | 0.75 | 4.13 | 3.48 | 2.93 | 2.47 | 1.18 | 1.08 | 1.35 | 12.57 | 3.34 ●100F |
| 2000 | 20.6 | 27.3 | 20.6 | 2.16 | 1.82 | 1.53 | 1.29 | 0.56 | 3.35 | 2.82 | 2.38 | 2.01 | 0.95 | 1.07 | 1.20 | 12.57 | |

TABLE 17 : NOx AT 50.0 MPH.

## TABLE 18

## LOW ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 55.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | LDGV 0°F | 25°F | 50°F | 75°F | 100°F | LDGT 0°F | 25°F | 50°F | 75°F | 100°F | -LDDV- 0-100F | -LDDT- 0-100F | -HDDV- 0-100F | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 4.74 | 4.16 | 3.66 | 3.23 | 2.42 | 6.03 | 5.35 | 4.78 | 4.28 | 3.32 | 1.60 | 2.15 | 29.69 | |
| 1980 | 0.0 | 100.0 | 0.0 | 6.53 | 5.81 | 5.19 | 4.65 | 3.32 | 8.51 | 7.66 | 6.92 | 6.27 | 4.56 | 1.86 | 2.57 | 29.69 | 10.56 @ 0F |
| 1980 | 100.0 | 0.0 | 100.0 | 5.52 | 5.16 | 4.89 | 4.67 | 3.59 | 6.22 | 6.17 | 6.18 | 6.22 | 5.06 | 2.01 | 2.78 | 29.69 | 9.83 @ 25F |
| 1980 | 50.0 | 0.0 | 50.0 | 5.21 | 4.75 | 4.37 | 4.05 | 3.10 | 6.21 | 5.87 | 5.60 | 5.39 | 4.31 | 1.78 | 2.43 | 29.69 | 9.19 @ 50F |
| 1980 | 0.0 | 50.0 | 0.0 | 5.78 | 5.11 | 4.54 | 4.05 | 2.95 | 7.45 | 6.67 | 6.00 | 5.42 | 4.04 | 1.72 | 2.34 | 29.69 | 8.62 @ 75F |
| 1980 | 50.0 | 50.0 | 50.0 | 6.02 | 5.49 | 5.04 | 4.66 | 3.46 | 7.36 | 6.91 | 6.55 | 6.25 | 4.81 | 1.94 | 2.67 | 29.69 | 6.21 @100F |
| 1980 | 20.6 | 27.3 | 20.6 | 5.51 | 4.93 | 4.44 | 4.02 | 2.99 | 6.89 | 6.29 | 5.79 | 5.37 | 4.13 | 1.74 | 2.37 | 29.69 | |
| | | | | | | | | | | | | | | | | | |
| 1985 | 0.0 | 0.0 | 0.0 | 3.05 | 2.66 | 2.33 | 2.04 | 1.36 | 5.05 | 4.43 | 3.89 | 3.43 | 2.45 | 1.63 | 1.80 | 24.83 | |
| 1985 | 0.0 | 100.0 | 0.0 | 4.37 | 3.84 | 3.39 | 3.00 | 1.95 | 7.43 | 6.65 | 5.96 | 5.36 | 3.59 | 1.66 | 2.14 | 24.83 | 8.72 @ 0F |
| 1985 | 100.0 | 0.0 | 100.0 | 4.18 | 3.78 | 3.44 | 3.16 | 1.98 | 7.11 | 6.38 | 5.80 | 5.34 | 3.56 | 1.77 | 2.31 | 24.83 | 8.18 @ 25F |
| 1985 | 50.0 | 0.0 | 50.0 | 3.64 | 3.24 | 2.91 | 2.63 | 1.70 | 6.10 | 5.44 | 4.89 | 4.44 | 3.06 | 1.69 | 2.03 | 24.83 | 7.70 @ 50F |
| 1985 | 0.0 | 50.0 | 0.0 | 3.75 | 3.29 | 2.90 | 2.56 | 1.68 | 6.32 | 5.60 | 4.99 | 4.46 | 3.06 | 1.65 | 1.95 | 24.83 | 7.27 @ 75F |
| 1985 | 50.0 | 50.0 | 50.0 | 4.27 | 3.81 | 3.41 | 3.08 | 1.96 | 7.27 | 6.51 | 5.88 | 5.35 | 3.57 | 1.72 | 2.22 | 24.83 | 5.41 @100F |
| 1985 | 20.6 | 27.3 | 20.6 | 3.68 | 3.25 | 2.88 | 2.57 | 1.68 | 6.18 | 5.49 | 4.91 | 4.41 | 3.04 | 1.66 | 1.97 | 24.83 | |
| | | | | | | | | | | | | | | | | | |
| 1988 | 0.0 | 0.0 | 0.0 | 2.41 | 2.09 | 1.81 | 1.57 | 0.93 | 4.77 | 4.14 | 3.60 | 3.14 | 2.12 | 1.38 | 1.57 | 21.15 | |
| 1988 | 0.0 | 100.0 | 0.0 | 3.62 | 3.11 | 2.68 | 2.32 | 1.39 | 7.02 | 6.23 | 5.54 | 4.94 | 3.15 | 1.38 | 1.87 | 21.15 | 8.23 @ 0F |
| 1988 | 100.0 | 0.0 | 100.0 | 3.58 | 3.18 | 2.84 | 2.55 | 1.39 | 7.23 | 6.30 | 5.54 | 4.92 | 2.97 | 1.47 | 2.01 | 21.15 | 7.78 @ 25F |
| 1988 | 50.0 | 0.0 | 50.0 | 2.99 | 2.63 | 2.32 | 2.06 | 1.16 | 6.00 | 5.23 | 4.59 | 4.06 | 2.57 | 1.42 | 1.77 | 21.15 | 7.36 @ 50F |
| 1988 | 0.0 | 50.0 | 0.0 | 3.02 | 2.60 | 2.25 | 1.96 | 1.17 | 5.93 | 5.21 | 4.60 | 4.07 | 2.66 | 1.38 | 1.70 | 21.15 | 6.97 @ 75F |
| 1988 | 50.0 | 50.0 | 50.0 | 3.60 | 3.15 | 2.76 | 2.44 | 1.39 | 7.12 | 6.26 | 5.54 | 4.93 | 3.06 | 1.43 | 1.94 | 21.15 | 4.26 @100F |
| 1988 | 20.6 | 27.3 | 20.6 | 2.98 | 2.59 | 2.26 | 1.98 | 1.16 | 5.91 | 5.17 | 4.55 | 4.02 | 2.61 | 1.40 | 1.72 | 21.15 | |
| | | | | | | | | | | | | | | | | | |
| 1990 | 0.0 | 0.0 | 0.0 | 2.16 | 1.85 | 1.59 | 1.37 | 0.73 | 4.36 | 3.77 | 3.26 | 2.83 | 1.82 | 1.30 | 1.40 | 18.15 | |
| 1990 | 0.0 | 100.0 | 0.0 | 3.36 | 2.83 | 2.39 | 2.03 | 1.14 | 6.48 | 5.68 | 5.00 | 4.42 | 2.73 | 1.29 | 1.66 | 18.15 | 8.25 @ 0F |
| 1990 | 100.0 | 0.0 | 100.0 | 3.32 | 2.92 | 2.57 | 2.28 | 1.14 | 6.67 | 5.77 | 5.03 | 4.42 | 2.51 | 1.37 | 1.78 | 18.15 | 7.82 @ 25F |
| 1990 | 50.0 | 0.0 | 50.0 | 2.71 | 2.37 | 2.07 | 1.81 | 0.94 | 5.50 | 4.76 | 4.14 | 3.63 | 2.18 | 1.33 | 1.57 | 18.15 | 7.41 @ 50F |
| 1990 | 0.0 | 50.0 | 0.0 | 2.74 | 2.33 | 1.98 | 1.70 | 0.94 | 5.43 | 4.74 | 4.14 | 3.63 | 2.29 | 1.30 | 1.51 | 18.15 | 7.04 @ 75F |
| 1990 | 50.0 | 50.0 | 50.0 | 3.34 | 2.87 | 2.48 | 2.15 | 1.14 | 6.57 | 5.73 | 5.02 | 4.42 | 2.62 | 1.33 | 1.72 | 18.15 | 3.94 @100F |
| 1990 | 20.6 | 27.3 | 20.6 | 2.70 | 2.32 | 2.00 | 1.73 | 0.93 | 5.41 | 4.70 | 4.11 | 3.60 | 2.22 | 1.31 | 1.53 | 18.15 | |
| | | | | | | | | | | | | | | | | | |
| 1995 | 0.0 | 0.0 | 0.0 | 1.80 | 1.53 | 1.30 | 1.11 | 0.48 | 3.50 | 2.98 | 2.54 | 2.17 | 1.19 | 1.23 | 1.27 | 15.22 | |
| 1995 | 0.0 | 100.0 | 0.0 | 3.06 | 2.49 | 2.03 | 1.65 | 0.83 | 5.36 | 4.54 | 3.86 | 3.29 | 1.85 | 1.21 | 1.51 | 15.22 | 8.31 @ 0F |
| 1995 | 100.0 | 0.0 | 100.0 | 2.90 | 2.53 | 2.22 | 1.94 | 0.84 | 5.29 | 4.53 | 3.90 | 3.36 | 1.66 | 1.28 | 1.62 | 15.22 | 7.91 @ 25F |
| 1995 | 50.0 | 0.0 | 50.0 | 2.31 | 2.00 | 1.73 | 1.50 | 0.65 | 4.36 | 3.73 | 3.19 | 2.75 | 1.42 | 1.25 | 1.43 | 15.22 | 7.53 @ 50F |
| 1995 | 0.0 | 50.0 | 0.0 | 2.38 | 1.98 | 1.64 | 1.36 | 0.64 | 4.39 | 3.73 | 3.18 | 2.72 | 1.51 | 1.22 | 1.38 | 15.22 | 7.17 @ 75F |
| 1995 | 50.0 | 50.0 | 50.0 | 2.98 | 2.51 | 2.12 | 1.80 | 0.84 | 5.33 | 4.54 | 3.88 | 3.33 | 1.75 | 1.25 | 1.56 | 15.22 | 3.58 @100F |
| 1995 | 20.6 | 27.3 | 20.6 | 2.33 | 1.97 | 1.66 | 1.41 | 0.64 | 4.34 | 3.70 | 3.16 | 2.70 | 1.46 | 1.23 | 1.39 | 15.22 | |
| | | | | | | | | | | | | | | | | | |
| 2000 | 0.0 | 0.0 | 0.0 | 1.73 | 1.47 | 1.25 | 1.06 | 0.43 | 2.86 | 2.43 | 2.06 | 1.75 | 0.81 | 1.22 | 1.26 | 14.35 | |
| 2000 | 0.0 | 100.0 | 0.0 | 3.02 | 2.44 | 1.97 | 1.59 | 0.77 | 4.58 | 3.76 | 3.09 | 2.55 | 1.31 | 1.20 | 1.49 | 14.35 | 8.25 @ 0F |
| 2000 | 100.0 | 0.0 | 100.0 | 2.81 | 2.46 | 2.15 | 1.88 | 0.80 | 4.17 | 3.60 | 3.10 | 2.68 | 1.19 | 1.27 | 1.59 | 14.35 | 7.85 @ 25F |
| 2000 | 50.0 | 0.0 | 50.0 | 2.23 | 1.93 | 1.67 | 1.44 | 0.60 | 3.47 | 2.97 | 2.55 | 2.18 | 0.99 | 1.25 | 1.41 | 14.35 | 7.47 @ 50F |
| 2000 | 0.0 | 50.0 | 0.0 | 2.33 | 1.92 | 1.58 | 1.30 | 0.59 | 3.66 | 3.05 | 2.54 | 2.12 | 1.04 | 1.21 | 1.36 | 14.35 | 7.12 @ 75F |
| 2000 | 50.0 | 50.0 | 50.0 | 2.92 | 2.45 | 2.06 | 1.73 | 0.78 | 4.38 | 3.68 | 3.10 | 2.61 | 1.25 | 1.24 | 1.54 | 14.35 | 3.45 @100F |
| 2000 | 20.6 | 27.3 | 20.6 | 2.26 | 1.90 | 1.60 | 1.35 | 0.59 | 3.55 | 2.99 | 2.52 | 2.13 | 1.01 | 1.23 | 1.38 | 14.35 | |

TABLE 18 : NOx AT 55.0 MPH.

# TABLE 19

# HIGH ALTITUDE

## THC EMISSION FACTORS (GRAMS/MILE) AT 5.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | LDGV 0°F | LDGV 25°F | LDGV 50°F | LDGV 75°F | LDGV 100°F | LDGT 0°F | LDGT 25°F | LDGT 50°F | LDGT 75°F | LDGT 100°F | -LDDV- 0-100F | -LDDT- 0-100F | -HDDV- 0-100F | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 19.09 | 17.32 | 15.86 | 14.64 | 18.52 | 29.55 | 27.27 | 25.34 | 23.71 | 28.07 | 1.74 | 3.72 | 19.81 | 67.74 @ 0F |
| 1980 | 0.0 | 100.0 | 0.0 | 17.49 | 17.45 | 17.48 | 17.57 | 24.26 | 28.14 | 27.99 | 27.88 | 27.82 | 35.97 | 1.79 | 3.78 | 19.81 | 60.32 @ 25F |
| 1980 | 100.0 | 0.0 | 100.0 | 138.95 | 80.27 | 47.01 | 28.13 | 21.70 | 202.24 | 117.64 | 69.41 | 41.89 | 32.11 | 2.93 | 6.12 | 19.81 | 53.90 @ 50F |
| 1980 | 50.0 | 0.0 | 50.0 | 68.04 | 42.98 | 28.49 | 20.04 | 19.69 | 101.15 | 64.68 | 43.51 | 31.11 | 29.61 | 2.19 | 4.63 | 19.81 | 48.33 @ 75F |
| 1980 | 0.0 | 50.0 | 0.0 | 18.26 | 17.22 | 16.39 | 15.73 | 20.70 | 28.79 | 27.41 | 26.25 | 25.28 | 31.14 | 1.73 | 3.68 | 19.81 | 53.53 @100F |
| 1980 | 50.0 | 50.0 | 50.0 | 78.22 | 48.86 | 32.24 | 22.85 | 22.98 | 115.19 | 72.82 | 48.65 | 34.85 | 34.04 | 2.36 | 4.95 | 19.81 | |
| 1980 | 20.6 | 27.3 | 20.6 | 38.67 | 27.76 | 21.31 | 17.44 | 20.18 | 58.44 | 42.65 | 33.27 | 27.58 | 30.36 | 1.92 | 4.07 | 19.81 | |
| 1985 | 0.0 | 0.0 | 0.0 | 13.07 | 11.23 | 9.77 | 8.59 | 12.01 | 24.45 | 21.35 | 18.83 | 16.78 | 23.48 | 0.97 | 1.83 | 17.65 | 41.93 @ 0F |
| 1985 | 0.0 | 100.0 | 0.0 | 12.57 | 11.88 | 11.33 | 10.90 | 16.10 | 21.98 | 21.40 | 20.90 | 20.47 | 30.15 | 1.12 | 1.98 | 17.65 | 38.17 @ 25F |
| 1985 | 100.0 | 0.0 | 100.0 | 126.95 | 65.53 | 34.79 | 19.13 | 16.74 | 170.09 | 95.33 | 54.29 | 31.62 | 24.35 | 1.67 | 3.05 | 17.65 | 34.90 @ 50F |
| 1985 | 50.0 | 0.0 | 50.0 | 57.92 | 32.60 | 19.57 | 12.66 | 13.71 | 82.84 | 50.94 | 32.93 | 22.58 | 23.59 | 1.24 | 2.29 | 17.65 | 32.05 @ 75F |
| 1985 | 0.0 | 50.0 | 0.0 | 12.66 | 11.32 | 10.25 | 9.40 | 13.47 | 23.15 | 21.11 | 19.44 | 18.07 | 25.84 | 1.02 | 1.86 | 17.65 | 37.75 @100F |
| 1985 | 50.0 | 50.0 | 50.0 | 69.76 | 38.71 | 23.06 | 15.02 | 16.42 | 96.04 | 58.37 | 37.59 | 26.04 | 27.25 | 1.40 | 2.51 | 17.65 | |
| 1985 | 20.6 | 27.3 | 20.6 | 31.18 | 20.01 | 14.03 | 10.69 | 13.49 | 47.62 | 33.31 | 24.92 | 19.85 | 24.80 | 1.10 | 2.03 | 17.65 | |
| 1988 | 0.0 | 0.0 | 0.0 | 10.49 | 8.73 | 7.33 | 6.23 | 9.68 | 20.89 | 17.76 | 15.24 | 13.23 | 20.70 | 0.80 | 1.43 | 15.02 | 32.00 @ 0F |
| 1988 | 0.0 | 100.0 | 0.0 | 10.72 | 9.70 | 8.86 | 8.18 | 13.22 | 19.38 | 18.27 | 17.34 | 16.56 | 26.82 | 0.92 | 1.57 | 15.02 | 28.07 @ 25F |
| 1988 | 100.0 | 0.0 | 100.0 | 127.53 | 61.31 | 30.28 | 15.52 | 15.70 | 166.76 | 88.32 | 47.81 | 26.62 | 22.42 | 1.35 | 2.39 | 15.02 | 24.81 @ 50F |
| 1988 | 50.0 | 0.0 | 50.0 | 56.06 | 29.16 | 16.20 | 9.77 | 11.88 | 78.43 | 45.53 | 27.98 | 18.37 | 21.11 | 1.01 | 1.79 | 15.02 | 22.09 @ 75F |
| 1988 | 0.0 | 50.0 | 0.0 | 10.39 | 8.95 | 7.81 | 6.90 | 10.92 | 19.96 | 17.69 | 15.85 | 14.36 | 22.82 | 0.84 | 1.46 | 15.02 | 29.89 @100F |
| 1988 | 50.0 | 50.0 | 50.0 | 69.13 | 35.50 | 19.57 | 11.85 | 14.46 | 93.07 | 53.30 | 32.58 | 21.59 | 24.62 | 1.14 | 1.98 | 15.02 | |
| 1988 | 20.6 | 27.3 | 20.6 | 29.06 | 17.20 | 11.21 | 8.04 | 11.25 | 43.90 | 29.07 | 20.77 | 15.94 | 22.01 | 0.91 | 1.60 | 15.02 | |
| 1990 | 0.0 | 0.0 | 0.0 | 9.20 | 7.52 | 6.20 | 5.16 | 6.90 | 18.83 | 15.75 | 13.30 | 11.35 | 16.64 | 0.74 | 1.35 | 13.62 | 27.05 @ 0F |
| 1990 | 0.0 | 100.0 | 0.0 | 9.87 | 8.69 | 7.71 | 6.92 | 9.82 | 17.91 | 16.52 | 15.36 | 14.39 | 21.90 | 0.85 | 1.49 | 13.62 | 23.27 @ 25F |
| 1990 | 100.0 | 0.0 | 100.0 | 128.86 | 59.64 | 28.25 | 13.84 | 14.94 | 167.64 | 85.16 | 44.36 | 23.84 | 20.86 | 1.25 | 2.26 | 13.62 | 20.19 @ 50F |
| 1990 | 50.0 | 0.0 | 50.0 | 55.62 | 27.69 | 14.69 | 8.46 | 9.91 | 77.06 | 42.85 | 25.35 | 16.11 | 18.03 | 0.93 | 1.69 | 13.62 | 17.67 @ 75F |
| 1990 | 0.0 | 50.0 | 0.0 | 9.28 | 7.83 | 6.68 | 5.76 | 7.92 | 18.14 | 15.79 | 13.90 | 12.37 | 18.43 | 0.78 | 1.38 | 13.62 | 21.10 @100F |
| 1990 | 50.0 | 50.0 | 50.0 | 69.37 | 34.16 | 17.98 | 10.38 | 12.38 | 92.78 | 50.84 | 29.86 | 19.12 | 21.38 | 1.05 | 1.87 | 13.62 | |
| 1990 | 20.6 | 27.3 | 20.6 | 28.21 | 15.93 | 9.92 | 6.83 | 8.67 | 42.25 | 26.84 | 18.54 | 13.84 | 18.17 | 0.84 | 1.51 | 13.62 | |
| 1995 | 0.0 | 0.0 | 0.0 | 7.12 | 5.69 | 4.57 | 3.70 | 4.08 | 14.59 | 11.81 | 9.62 | 7.90 | 10.78 | 0.71 | 1.34 | 11.97 | 22.24 @ 0F |
| 1995 | 0.0 | 100.0 | 0.0 | 8.45 | 7.09 | 5.98 | 5.07 | 6.38 | 15.04 | 13.14 | 11.56 | 10.26 | 14.80 | 0.81 | 1.49 | 11.97 | 18.57 @ 25F |
| 1995 | 100.0 | 0.0 | 100.0 | 127.60 | 55.79 | 24.67 | 11.15 | 14.13 | 166.45 | 77.58 | 36.97 | 18.19 | 19.08 | 1.16 | 2.24 | 11.97 | 15.63 @ 50F |
| 1995 | 50.0 | 0.0 | 50.0 | 53.77 | 25.03 | 12.29 | 6.52 | 7.90 | 73.41 | 37.20 | 20.10 | 11.77 | 13.80 | 0.88 | 1.68 | 11.97 | 13.27 @ 75F |
| 1995 | 0.0 | 50.0 | 0.0 | 7.50 | 6.12 | 5.03 | 4.16 | 4.89 | 14.47 | 12.09 | 10.20 | 8.68 | 12.14 | 0.74 | 1.38 | 11.97 | 15.78 @100F |
| 1995 | 50.0 | 50.0 | 50.0 | 68.02 | 31.44 | 15.33 | 8.11 | 10.25 | 90.75 | 45.36 | 24.27 | 14.22 | 16.94 | 0.99 | 1.87 | 11.97 | |
| 1995 | 20.6 | 27.3 | 20.6 | 26.38 | 13.82 | 7.97 | 5.10 | 6.08 | 38.55 | 22.33 | 14.21 | 9.90 | 12.75 | 0.79 | 1.50 | 11.97 | |
| 2000 | 0.0 | 0.0 | 0.0 | 6.49 | 5.16 | 4.12 | 3.32 | 3.32 | 11.59 | 9.23 | 7.39 | 5.95 | 6.74 | 0.72 | 1.37 | 11.39 | 20.63 @ 0F |
| 2000 | 0.0 | 100.0 | 0.0 | 7.90 | 6.55 | 5.45 | 4.56 | 5.43 | 13.01 | 10.91 | 9.19 | 7.78 | 9.98 | 0.82 | 1.55 | 11.39 | 17.00 @ 25F |
| 2000 | 100.0 | 0.0 | 100.0 | 122.55 | 52.84 | 22.95 | 10.14 | 13.49 | 161.83 | 71.28 | 31.81 | 14.55 | 17.94 | 1.17 | 2.30 | 11.39 | 14.11 @ 50F |
| 2000 | 50.0 | 0.0 | 50.0 | 51.43 | 23.57 | 11.36 | 5.91 | 7.21 | 69.70 | 33.14 | 16.73 | 9.18 | 10.96 | 0.89 | 1.72 | 11.39 | 11.82 @ 75F |
| 2000 | 0.0 | 50.0 | 0.0 | 6.90 | 5.60 | 4.56 | 3.74 | 4.08 | 11.90 | 9.69 | 7.94 | 6.55 | 7.87 | 0.75 | 1.42 | 11.39 | 14.03 @100F |
| 2000 | 50.0 | 50.0 | 50.0 | 65.22 | 29.70 | 14.20 | 7.35 | 9.46 | 87.42 | 41.09 | 20.50 | 11.16 | 13.96 | 0.99 | 1.93 | 11.39 | |
| 2000 | 20.6 | 27.3 | 20.6 | 25.07 | 12.92 | 7.31 | 4.60 | 5.32 | 35.50 | 19.25 | 11.50 | 7.59 | 9.07 | 0.80 | 1.54 | 11.39 | |

TABLE 19 : THC AT 5.0 MPH.

## TABLE 20

## HIGH ALTITUDE

### THC EMISSION FACTORS (GRAMS/MILE) AT 10.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | LDGV 0°F | LDGV 25°F | LDGV 50°F | LDGV 75°F | LDGV 100°F | LDGT 0°F | LDGT 25°F | LDGT 50°F | LDGT 75°F | LDGT 100°F | -LDDV- 0-100F | -LDDT- 0-100F | -HDDV- 0-100F | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 11.85 | 10.90 | 10.11 | 9.46 | 11.54 | 18.43 | 17.20 | 16.16 | 15.28 | 17.62 | 1.37 | 2.92 | 15.55 | |
| 1980 | 0.0 | 100.0 | 0.0 | 10.98 | 10.97 | 10.99 | 11.05 | 14.67 | 17.68 | 17.61 | 17.55 | 17.53 | 21.96 | 1.41 | 2.97 | 15.55 | 47.87 @ 0F |
| 1980 | 100.0 | 0.0 | 100.0 | 77.15 | 45.19 | 27.07 | 16.79 | 13.30 | 113.07 | 66.73 | 40.31 | 25.23 | 19.88 | 2.30 | 4.80 | 15.55 | 43.01 @ 25F |
| 1980 | 50.0 | 0.0 | 50.0 | 38.54 | 24.89 | 17.00 | 12.39 | 12.19 | 57.71 | 37.72 | 26.13 | 19.33 | 18.49 | 1.72 | 3.63 | 15.55 | 38.80 @ 50F |
| 1980 | 0.0 | 50.0 | 0.0 | 11.40 | 10.85 | 10.40 | 10.05 | 12.73 | 18.03 | 17.28 | 16.66 | 16.14 | 19.31 | 1.36 | 2.89 | 15.55 | 35.15 @ 75F |
| 1980 | 50.0 | 50.0 | 50.0 | 44.06 | 28.08 | 19.03 | 13.92 | 13.98 | 65.38 | 42.17 | 28.93 | 21.38 | 20.92 | 1.85 | 3.89 | 15.55 | 38.56 @100F |
| 1980 | 20.6 | 27.3 | 20.6 | 22.53 | 16.59 | 13.08 | 10.98 | 12.45 | 34.29 | 25.64 | 20.51 | 17.40 | 18.89 | 1.51 | 3.19 | 15.55 | |
| 1985 | 0.0 | 0.0 | 0.0 | 7.90 | 6.92 | 6.13 | 5.50 | 7.33 | 14.65 | 12.99 | 11.64 | 10.54 | 14.12 | 0.76 | 1.44 | 13.85 | |
| 1985 | 0.0 | 100.0 | 0.0 | 7.63 | 7.26 | 6.97 | 6.75 | 9.55 | 13.33 | 13.02 | 12.75 | 12.53 | 17.74 | 0.88 | 1.55 | 13.85 | 30.88 @ 0F |
| 1985 | 100.0 | 0.0 | 100.0 | 69.22 | 36.18 | 19.62 | 11.18 | 9.89 | 93.67 | 53.15 | 30.88 | 18.58 | 14.64 | 1.31 | 2.39 | 13.85 | 28.41 @ 25F |
| 1985 | 50.0 | 0.0 | 50.0 | 32.07 | 18.44 | 11.42 | 7.70 | 8.25 | 46.36 | 29.07 | 19.30 | 13.68 | 14.20 | 0.97 | 1.80 | 13.85 | 26.27 @ 50F |
| 1985 | 0.0 | 50.0 | 0.0 | 7.68 | 6.96 | 6.39 | 5.94 | 8.12 | 13.95 | 12.86 | 11.96 | 11.23 | 15.41 | 0.80 | 1.46 | 13.85 | 24.40 @ 75F |
| 1985 | 50.0 | 50.0 | 50.0 | 38.42 | 21.72 | 13.30 | 8.97 | 9.72 | 53.50 | 33.08 | 21.82 | 15.55 | 16.19 | 1.10 | 1.97 | 13.85 | 28.14 @100F |
| 1985 | 20.6 | 27.3 | 20.6 | 17.66 | 11.65 | 8.43 | 6.64 | 8.13 | 27.24 | 19.49 | 14.94 | 12.20 | 14.85 | 0.87 | 1.60 | 13.85 | |
| 1988 | 0.0 | 0.0 | 0.0 | 6.21 | 5.27 | 4.52 | 3.93 | 5.87 | 12.29 | 10.61 | 9.26 | 8.18 | 12.31 | 0.63 | 1.13 | 11.79 | |
| 1988 | 0.0 | 100.0 | 0.0 | 6.33 | 5.78 | 5.34 | 4.98 | 7.77 | 11.48 | 10.89 | 10.39 | 9.97 | 15.62 | 0.72 | 1.23 | 11.79 | 22.99 @ 0F |
| 1988 | 100.0 | 0.0 | 100.0 | 68.96 | 33.47 | 16.83 | 8.91 | 9.10 | 90.97 | 48.70 | 26.85 | 15.41 | 13.27 | 1.06 | 1.88 | 11.79 | 20.42 @ 25F |
| 1988 | 50.0 | 0.0 | 50.0 | 30.65 | 16.23 | 9.28 | 5.83 | 7.05 | 43.35 | 25.61 | 16.15 | 10.96 | 12.54 | 0.79 | 1.41 | 11.79 | 18.28 @ 50F |
| 1988 | 0.0 | 50.0 | 0.0 | 6.15 | 5.39 | 4.78 | 4.29 | 6.54 | 11.79 | 10.57 | 9.59 | 8.79 | 13.46 | 0.66 | 1.15 | 11.79 | 16.49 @ 75F |
| 1988 | 50.0 | 50.0 | 50.0 | 37.64 | 19.63 | 11.09 | 6.95 | 8.43 | 51.22 | 29.79 | 18.62 | 12.69 | 14.44 | 0.89 | 1.55 | 11.79 | 21.95 @100F |
| 1988 | 20.6 | 27.3 | 20.6 | 16.16 | 9.81 | 6.60 | 4.90 | 6.71 | 24.71 | 16.72 | 12.25 | 9.65 | 13.02 | 0.71 | 1.25 | 11.79 | |
| 1990 | 0.0 | 0.0 | 0.0 | 5.38 | 4.48 | 3.78 | 3.22 | 4.15 | 10.97 | 9.32 | 8.01 | 6.96 | 9.80 | 0.58 | 1.06 | 10.69 | |
| 1990 | 0.0 | 100.0 | 0.0 | 5.74 | 5.11 | 4.59 | 4.16 | 5.72 | 10.48 | 9.73 | 9.11 | 8.60 | 12.63 | 0.67 | 1.17 | 10.69 | 19.29 @ 0F |
| 1990 | 100.0 | 0.0 | 100.0 | 69.44 | 32.39 | 15.59 | 7.87 | 8.46 | 91.01 | 46.68 | 24.73 | 13.69 | 12.07 | 0.98 | 1.77 | 10.69 | 16.81 @ 25F |
| 1990 | 50.0 | 0.0 | 50.0 | 30.23 | 15.29 | 8.32 | 4.99 | 5.76 | 42.31 | 23.92 | 14.50 | 9.53 | 10.55 | 0.73 | 1.33 | 10.69 | 14.79 @ 50F |
| 1990 | 0.0 | 50.0 | 0.0 | 5.42 | 4.65 | 4.03 | 3.54 | 4.70 | 10.60 | 9.34 | 8.33 | 7.52 | 10.76 | 0.61 | 1.09 | 10.69 | 13.14 @ 75F |
| 1990 | 50.0 | 50.0 | 50.0 | 37.59 | 18.75 | 10.09 | 6.02 | 7.09 | 50.74 | 28.21 | 16.92 | 11.14 | 12.35 | 0.83 | 1.47 | 10.69 | 15.39 @100F |
| 1990 | 20.6 | 27.3 | 20.6 | 15.56 | 8.99 | 5.77 | 4.12 | 5.10 | 23.57 | 15.29 | 10.83 | 8.31 | 10.62 | 0.66 | 1.18 | 10.69 | |
| 1995 | 0.0 | 0.0 | 0.0 | 4.10 | 3.33 | 2.73 | 2.27 | 2.47 | 8.35 | 6.86 | 5.69 | 4.77 | 6.31 | 0.55 | 1.05 | 9.40 | |
| 1995 | 0.0 | 100.0 | 0.0 | 4.81 | 4.08 | 3.49 | 3.00 | 3.70 | 8.59 | 7.57 | 6.73 | 6.03 | 8.47 | 0.63 | 1.17 | 9.40 | 15.65 @ 0F |
| 1995 | 100.0 | 0.0 | 100.0 | 68.52 | 30.12 | 13.48 | 6.25 | 7.85 | 89.64 | 42.08 | 20.34 | 10.29 | 10.76 | 0.91 | 1.76 | 9.40 | 13.24 @ 25F |
| 1995 | 50.0 | 0.0 | 50.0 | 29.04 | 13.68 | 6.86 | 3.78 | 4.52 | 39.84 | 20.46 | 11.31 | 6.85 | 7.93 | 0.69 | 1.32 | 9.40 | 11.31 @ 50F |
| 1995 | 0.0 | 50.0 | 0.0 | 4.30 | 3.56 | 2.98 | 2.52 | 2.91 | 8.29 | 7.02 | 6.00 | 5.19 | 7.04 | 0.58 | 1.08 | 9.40 | 9.77 @ 75F |
| 1995 | 50.0 | 50.0 | 50.0 | 36.66 | 17.10 | 8.49 | 4.63 | 5.77 | 49.12 | 24.83 | 13.54 | 8.16 | 9.61 | 0.77 | 1.46 | 9.40 | 11.41 @100F |
| 1995 | 20.6 | 27.3 | 20.6 | 14.40 | 7.68 | 4.55 | 3.02 | 3.54 | 21.18 | 12.50 | 8.15 | 5.84 | 7.37 | 0.62 | 1.17 | 9.40 | |
| 2000 | 0.0 | 0.0 | 0.0 | 3.72 | 3.01 | 2.45 | 2.02 | 2.02 | 6.61 | 5.35 | 4.36 | 3.60 | 4.02 | 0.57 | 1.07 | 8.94 | |
| 2000 | 0.0 | 100.0 | 0.0 | 4.47 | 3.75 | 3.16 | 2.68 | 3.15 | 7.37 | 6.25 | 5.33 | 4.57 | 5.75 | 0.64 | 1.22 | 8.94 | 14.46 @ 0F |
| 2000 | 100.0 | 0.0 | 100.0 | 65.78 | 28.50 | 12.52 | 5.67 | 7.46 | 86.94 | 38.53 | 17.42 | 8.19 | 10.01 | 0.92 | 1.81 | 8.94 | 12.08 @ 25F |
| 2000 | 50.0 | 0.0 | 50.0 | 27.75 | 12.85 | 6.32 | 3.41 | 4.10 | 37.68 | 18.13 | 9.36 | 5.32 | 6.28 | 0.70 | 1.35 | 8.94 | 10.18 @ 50F |
| 2000 | 0.0 | 50.0 | 0.0 | 3.94 | 3.24 | 2.69 | 2.25 | 2.43 | 6.78 | 5.60 | 4.66 | 3.92 | 4.62 | 0.59 | 1.11 | 8.94 | 8.68 @ 75F |
| 2000 | 50.0 | 50.0 | 50.0 | 35.12 | 16.13 | 7.84 | 4.18 | 5.31 | 47.16 | 22.39 | 11.38 | 6.38 | 7.88 | 0.78 | 1.51 | 8.94 | 10.13 @100F |
| 2000 | 20.6 | 27.3 | 20.6 | 13.65 | 7.15 | 4.16 | 2.71 | 3.09 | 19.39 | 10.71 | 6.56 | 4.47 | 5.27 | 0.63 | 1.21 | 8.94 | |

TABLE 20 : THC AT 10.0 MPH.

## TABLE 21

## HIGH ALTITUDE

### THC EMISSION FACTORS (GRAMS/MILE) AT 19.6 MPH

| Cal. Year | Cold/Hot Start VMT Percentages | | | LDGV | | | | | LDGT | | | | | -LDDV- | -LDDT- | -HDDV- | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PCCN | PCHC | PCCC | 0°F | 25°F | 50°F | 75°F | 100°F | 0°F | 25°F | 50°F | 75°F | 100°F | 0-100F | 0-100F | 0-100F | |
| 1980 | 0.0 | 0.0 | 0.0 | 8.42 | 7.86 | 7.39 | 7.00 | 8.23 | 13.15 | 12.42 | 11.81 | 11.28 | 12.66 | 0.91 | 1.95 | 10.39 | 28.94 @ 0F |
| 1980 | 0.0 | 100.0 | 0.0 | 7.89 | 7.90 | 7.92 | 7.96 | 10.12 | 12.72 | 12.68 | 12.65 | 12.65 | 15.31 | 0.94 | 1.98 | 10.39 | 26.52 @ 25F |
| 1980 | 100.0 | 0.0 | 100.0 | 47.87 | 28.57 | 17.63 | 11.42 | 9.32 | 70.77 | 42.58 | 26.51 | 17.33 | 14.08 | 1.53 | 3.21 | 10.39 | 24.41 @ 50F |
| 1980 | 50.0 | 0.0 | 50.0 | 24.57 | 16.32 | 11.56 | 8.78 | 8.64 | 37.10 | 24.94 | 17.88 | 13.75 | 13.21 | 1.15 | 2.43 | 10.39 | 22.59 @ 75F |
| 1980 | 0.0 | 50.0 | 0.0 | 8.15 | 7.82 | 7.57 | 7.36 | 8.95 | 12.92 | 12.48 | 12.11 | 11.80 | 13.69 | 0.91 | 1.93 | 10.39 | 24.30 @100F |
| 1980 | 50.0 | 50.0 | 50.0 | 27.88 | 18.23 | 12.77 | 9.69 | 9.72 | 41.74 | 27.63 | 19.58 | 14.99 | 14.69 | 1.24 | 2.60 | 10.39 | |
| 1980 | 20.6 | 27.3 | 20.6 | 14.88 | 11.30 | 9.19 | 7.92 | 8.79 | 22.82 | 17.57 | 14.46 | 12.57 | 13.44 | 1.01 | 2.13 | 10.39 | |
| 1985 | 0.0 | 0.0 | 0.0 | 5.44 | 4.87 | 4.41 | 4.04 | 5.11 | 9.99 | 9.01 | 8.22 | 7.57 | 9.67 | 0.51 | 0.96 | 9.26 | 20.35 @ 0F |
| 1985 | 0.0 | 100.0 | 0.0 | 5.28 | 5.07 | 4.90 | 4.77 | 6.43 | 9.21 | 9.03 | 8.88 | 8.75 | 11.84 | 0.59 | 1.04 | 9.26 | 19.12 @ 25F |
| 1985 | 100.0 | 0.0 | 100.0 | 41.78 | 22.23 | 12.41 | 7.41 | 6.63 | 57.35 | 33.10 | 19.76 | 12.39 | 10.02 | 0.88 | 1.60 | 9.26 | 18.05 @ 50F |
| 1985 | 50.0 | 0.0 | 50.0 | 19.78 | 11.71 | 7.55 | 5.34 | 5.66 | 29.03 | 18.67 | 12.82 | 9.46 | 9.74 | 0.65 | 1.20 | 9.26 | 17.12 @ 75F |
| 1985 | 0.0 | 50.0 | 0.0 | 5.31 | 4.89 | 4.56 | 4.30 | 5.58 | 9.58 | 8.94 | 8.41 | 7.99 | 10.45 | 0.53 | 0.98 | 9.26 | 18.98 @100F |
| 1985 | 50.0 | 50.0 | 50.0 | 23.53 | 13.65 | 8.66 | 6.09 | 6.53 | 33.28 | 21.07 | 14.32 | 10.57 | 10.93 | 0.73 | 1.32 | 9.26 | |
| 1985 | 20.6 | 27.3 | 20.6 | 11.23 | 7.68 | 5.77 | 4.71 | 5.59 | 17.55 | 12.92 | 10.21 | 8.57 | 10.12 | 0.58 | 1.07 | 9.26 | |
| 1988 | 0.0 | 0.0 | 0.0 | 4.17 | 3.62 | 3.18 | 2.84 | 4.05 | 8.19 | 7.21 | 6.42 | 5.78 | 8.32 | 0.42 | 0.75 | 7.88 | 14.41 @ 0F |
| 1988 | 0.0 | 100.0 | 0.0 | 4.24 | 3.92 | 3.66 | 3.45 | 5.18 | 7.72 | 7.37 | 7.09 | 6.84 | 10.30 | 0.48 | 0.82 | 7.88 | 13.13 @ 25F |
| 1988 | 100.0 | 0.0 | 100.0 | 41.07 | 20.22 | 10.43 | 5.77 | 5.96 | 54.91 | 29.85 | 16.88 | 10.08 | 8.91 | 0.71 | 1.25 | 7.88 | 12.06 @ 50F |
| 1988 | 50.0 | 0.0 | 50.0 | 18.55 | 10.08 | 5.99 | 3.96 | 4.75 | 26.66 | 16.14 | 10.52 | 7.44 | 8.47 | 0.53 | 0.94 | 7.88 | 11.17 @ 75F |
| 1988 | 0.0 | 50.0 | 0.0 | 4.14 | 3.69 | 3.33 | 3.05 | 4.45 | 7.90 | 7.19 | 6.61 | 6.15 | 9.01 | 0.44 | 0.77 | 7.88 | 14.38 @100F |
| 1988 | 50.0 | 50.0 | 50.0 | 22.66 | 12.07 | 7.05 | 4.61 | 5.57 | 31.31 | 18.61 | 11.98 | 8.46 | 9.60 | 0.60 | 1.04 | 7.88 | |
| 1988 | 20.6 | 27.3 | 20.6 | 10.03 | 6.29 | 4.41 | 3.41 | 4.55 | 15.58 | 10.85 | 8.20 | 6.66 | 8.75 | 0.47 | 0.84 | 7.88 | |
| 1990 | 0.0 | 0.0 | 0.0 | 3.56 | 3.04 | 2.62 | 2.30 | 2.84 | 7.23 | 6.26 | 5.49 | 4.88 | 6.54 | 0.39 | 0.71 | 7.15 | 11.90 @ 0F |
| 1990 | 0.0 | 100.0 | 0.0 | 3.77 | 3.40 | 3.10 | 2.85 | 3.76 | 6.94 | 6.50 | 6.14 | 5.84 | 8.21 | 0.45 | 0.78 | 7.15 | 10.66 @ 25F |
| 1990 | 100.0 | 0.0 | 100.0 | 41.14 | 19.42 | 9.56 | 5.03 | 5.37 | 54.53 | 28.37 | 15.40 | 8.86 | 7.89 | 0.65 | 1.18 | 7.15 | 9.65 @ 50F |
| 1990 | 50.0 | 0.0 | 50.0 | 18.15 | 9.38 | 5.29 | 3.34 | 3.79 | 25.76 | 14.91 | 9.34 | 6.40 | 6.99 | 0.49 | 0.89 | 7.15 | 8.83 @ 75F |
| 1990 | 0.0 | 50.0 | 0.0 | 3.59 | 3.14 | 2.77 | 2.49 | 3.16 | 7.01 | 6.27 | 5.68 | 5.20 | 7.11 | 0.41 | 0.73 | 7.15 | 9.95 @100F |
| 1990 | 50.0 | 50.0 | 50.0 | 22.46 | 11.41 | 6.33 | 3.94 | 4.57 | 30.73 | 17.44 | 10.77 | 7.35 | 8.05 | 0.55 | 0.98 | 7.15 | |
| 1990 | 20.6 | 27.3 | 20.6 | 9.53 | 5.68 | 3.80 | 2.82 | 3.40 | 14.68 | 9.80 | 7.17 | 5.67 | 7.03 | 0.44 | 0.79 | 7.15 | |
| 1995 | 0.0 | 0.0 | 0.0 | 2.66 | 2.21 | 1.86 | 1.59 | 1.70 | 5.38 | 4.51 | 3.82 | 3.29 | 4.19 | 0.37 | 0.70 | 6.28 | 9.36 @ 0F |
| 1995 | 0.0 | 100.0 | 0.0 | 3.07 | 2.65 | 2.30 | 2.02 | 2.42 | 5.52 | 4.93 | 4.43 | 4.02 | 5.45 | 0.42 | 0.78 | 6.28 | 8.16 @ 25F |
| 1995 | 100.0 | 0.0 | 100.0 | 40.37 | 17.89 | 8.15 | 3.92 | 4.85 | 53.06 | 25.17 | 12.42 | 6.52 | 6.79 | 0.61 | 1.17 | 6.28 | 7.20 @ 50F |
| 1995 | 50.0 | 0.0 | 50.0 | 17.26 | 8.27 | 4.28 | 2.47 | 2.90 | 23.85 | 12.49 | 7.12 | 4.50 | 5.14 | 0.46 | 0.88 | 6.28 | 6.43 @ 75F |
| 1995 | 0.0 | 50.0 | 0.0 | 2.78 | 2.35 | 2.00 | 1.73 | 1.96 | 5.34 | 4.60 | 4.00 | 3.53 | 4.62 | 0.39 | 0.72 | 6.28 | 7.25 @100F |
| 1995 | 50.0 | 50.0 | 50.0 | 21.72 | 10.27 | 5.23 | 2.97 | 3.64 | 29.29 | 15.05 | 8.43 | 5.27 | 6.12 | 0.52 | 0.98 | 6.28 | |
| 1995 | 20.6 | 27.3 | 20.6 | 8.69 | 4.76 | 2.92 | 2.03 | 2.33 | 12.91 | 7.82 | 5.27 | 3.91 | 4.80 | 0.42 | 0.79 | 6.28 | |
| 2000 | 0.0 | 0.0 | 0.0 | 2.40 | 1.98 | 1.66 | 1.41 | 1.40 | 4.24 | 3.50 | 2.92 | 2.48 | 2.72 | 0.38 | 0.72 | 5.98 | 8.57 @ 0F |
| 2000 | 0.0 | 100.0 | 0.0 | 2.84 | 2.42 | 2.07 | 1.79 | 2.07 | 4.68 | 4.03 | 3.49 | 3.05 | 3.74 | 0.43 | 0.81 | 5.98 | 7.39 @ 25F |
| 2000 | 100.0 | 0.0 | 100.0 | 38.73 | 16.91 | 7.55 | 3.54 | 4.59 | 51.27 | 22.93 | 10.57 | 5.17 | 6.23 | 0.61 | 1.21 | 5.98 | 6.44 @ 50F |
| 2000 | 50.0 | 0.0 | 50.0 | 16.47 | 7.74 | 3.92 | 2.21 | 2.62 | 22.43 | 10.99 | 5.85 | 3.49 | 4.04 | 0.47 | 0.90 | 5.98 | 5.69 @ 75F |
| 2000 | 0.0 | 50.0 | 0.0 | 2.53 | 2.12 | 1.79 | 1.54 | 1.64 | 4.34 | 3.65 | 3.10 | 2.66 | 3.08 | 0.39 | 0.74 | 5.98 | 6.42 @100F |
| 2000 | 50.0 | 50.0 | 50.0 | 20.78 | 9.66 | 4.81 | 2.67 | 3.33 | 27.98 | 13.48 | 7.03 | 4.11 | 4.98 | 0.52 | 1.01 | 5.98 | |
| 2000 | 20.6 | 27.3 | 20.6 | 8.21 | 4.41 | 2.65 | 1.81 | 2.03 | 11.72 | 6.64 | 4.21 | 2.99 | 3.45 | 0.42 | 0.81 | 5.98 | |

TABLE 21 : THC AT 19.6 MPH.

# TABLE 22

## HIGH ALTITUDE

### THC EMISSION FACTORS (GRAMS/MILE) AT 35.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | LDGV 0°F | LDGV 25°F | LDGV 50°F | LDGV 75°F | LDGV 100°F | LDGT 0°F | LDGT 25°F | LDGT 50°F | LDGT 75°F | LDGT 100°F | -LDDV- 0-100F | -LDDT- 0-100F | -HDDV- 0-100F | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 6.52 | 6.20 | 5.93 | 5.70 | 6.39 | 10.35 | 9.92 | 9.55 | 9.23 | 10.01 | 0.57 | 1.21 | 6.45 | |
| 1980 | 0.0 | 100.0 | 0.0 | 6.20 | 6.22 | 6.25 | 6.29 | 7.59 | 10.12 | 10.10 | 10.10 | 10.11 | 11.74 | 0.58 | 1.23 | 6.45 | 18.60 @ 0F |
| 1980 | 100.0 | 0.0 | 100.0 | 31.58 | 19.36 | 12.42 | 8.4[illegible] | 7.14 | 48.38 | 29.83 | 19.24 | 13.18 | 11.05 | 0.95 | 1.99 | 6.45 | 17.50 @ 25F |
| 1980 | 50.0 | 0.0 | 50.0 | 16.86 | 11.62 | 8.59 | 6.82 | 6.68 | 26.24 | 18.23 | 13.58 | 10.85 | 10.42 | 0.71 | 1.51 | 6.45 | 16.56 @ 50F |
| 1980 | 0.0 | 50.0 | 0.0 | 6.36 | 6.18 | 6.04 | 5.93 | 6.85 | 10.22 | 9.97 | 9.75 | 9.57 | 10.69 | 0.56 | 1.20 | 6.45 | 15.73 @ 75F |
| 1980 | 50.0 | 50.0 | 50.0 | 18.89 | 12.79 | 9.33 | 7.38 | 7.37 | 29.25 | 19.97 | 14.67 | 11.64 | 11.39 | 0.77 | 1.61 | 6.45 | 16.50 @100F |
| 1980 | 20.6 | 27.3 | 20.6 | 10.66 | 8.41 | 7.08 | 6.28 | 6.76 | 16.79 | 13.35 | 11.31 | 10.08 | 10.55 | 0.62 | 1.32 | 6.45 | |
| 1985 | 0.0 | 0.0 | 0.0 | 3.94 | 3.63 | 3.38 | 3.17 | 3.76 | 7.23 | 6.68 | 6.24 | 5.88 | 7.03 | 0.32 | 0.60 | 5.75 | |
| 1985 | 0.0 | 100.0 | 0.0 | 3.83 | 3.73 | 3.65 | 3.59 | 4.53 | 6.80 | 6.71 | 6.63 | 6.57 | 8.33 | 0.36 | 0.64 | 5.75 | 14.59 @ 0F |
| 1985 | 100.0 | 0.0 | 100.0 | 24.76 | 13.63 | 8.01 | 5.11 | 4.64 | 35.95 | 21.34 | 13.27 | 8.78 | 7.34 | 0.54 | 0.99 | 5.75 | 14.04 @ 25F |
| 1985 | 50.0 | 0.0 | 50.0 | 12.20 | 7.60 | 5.21 | 3.93 | 4.08 | 18.86 | 12.61 | 9.07 | 7.03 | 7.11 | 0.40 | 0.75 | 5.75 | 13.56 @ 50F |
| 1985 | 0.0 | 50.0 | 0.0 | 3.86 | 3.64 | 3.46 | 3.32 | 4.04 | 7.00 | 6.65 | 6.36 | 6.13 | 7.50 | 0.33 | 0.61 | 5.75 | 13.14 @ 75F |
| 1985 | 50.0 | 50.0 | 50.0 | 14.30 | 8.68 | 5.83 | 4.35 | 4.59 | 21.37 | 14.02 | 9.95 | 7.68 | 7.84 | 0.45 | 0.82 | 5.75 | 13.98 @100F |
| 1985 | 20.6 | 27.3 | 20.6 | 7.27 | 5.26 | 4.17 | 3.56 | 4.04 | 11.86 | 9.09 | 7.46 | 6.48 | 7.32 | 0.36 | 0.66 | 5.75 | |
| 1988 | 0.0 | 0.0 | 0.0 | 2.88 | 2.58 | 2.35 | 2.16 | 2.92 | 5.68 | 5.14 | 4.70 | 4.35 | 5.89 | 0.26 | 0.47 | 4.89 | |
| 1988 | 0.0 | 100.0 | 0.0 | 2.91 | 2.74 | 2.61 | 2.50 | 3.56 | 5.41 | 5.23 | 5.08 | 4.96 | 7.05 | 0.30 | 0.51 | 4.89 | 9.72 @ 0F |
| 1988 | 100.0 | 0.0 | 100.0 | 23.25 | 11.78 | 6.37 | 3.79 | 3.98 | 32.69 | 18.30 | 10.80 | 6.85 | 6.30 | 0.44 | 0.78 | 4.89 | 9.14 @ 25F |
| 1988 | 50.0 | 0.0 | 50.0 | 10.84 | 6.17 | 3.91 | 2.78 | 3.31 | 16.42 | 10.36 | 7.11 | 5.32 | 6.01 | 0.33 | 0.58 | 4.89 | 8.66 @ 50F |
| 1988 | 0.0 | 50.0 | 0.0 | 2.86 | 2.62 | 2.43 | 2.27 | 3.15 | 5.51 | 5.13 | 4.82 | 4.56 | 6.30 | 0.27 | 0.48 | 4.89 | 8.26 @ 75F |
| 1988 | 50.0 | 50.0 | 50.0 | 13.08 | 7.26 | 4.49 | 3.14 | 3.77 | 19.05 | 11.77 | 7.94 | 5.90 | 6.68 | 0.37 | 0.64 | 4.89 | 10.24 @100F |
| 1988 | 20.6 | 27.3 | 20.6 | 6.12 | 4.07 | 3.03 | 2.48 | 3.20 | 9.98 | 7.27 | 5.75 | 4.86 | 6.16 | 0.29 | 0.52 | 4.89 | |
| 1990 | 0.0 | 0.0 | 0.0 | 2.39 | 2.11 | 1.89 | 1.71 | 2.01 | 4.88 | 4.35 | 3.94 | 3.60 | 4.50 | 0.24 | 0.44 | 4.44 | |
| 1990 | 0.0 | 100.0 | 0.0 | 2.50 | 2.30 | 2.14 | 2.01 | 2.51 | 4.72 | 4.49 | 4.30 | 4.14 | 5.46 | 0.28 | 0.48 | 4.44 | 7.86 @ 0F |
| 1990 | 100.0 | 0.0 | 100.0 | 22.86 | 11.05 | 5.68 | 3.20 | 3.38 | 31.55 | 16.88 | 9.57 | 5.86 | 5.28 | 0.41 | 0.73 | 4.44 | 7.30 @ 25F |
| 1990 | 50.0 | 0.0 | 50.0 | 10.34 | 5.57 | 3.35 | 2.28 | 2.52 | 15.37 | 9.28 | 6.14 | 4.47 | 4.76 | 0.30 | 0.55 | 4.44 | 6.84 @ 50F |
| 1990 | 0.0 | 50.0 | 0.0 | 2.41 | 2.16 | 1.97 | 1.81 | 2.18 | 4.76 | 4.36 | 4.04 | 3.78 | 4.83 | 0.25 | 0.45 | 4.44 | 6.47 @ 75F |
| 1990 | 50.0 | 50.0 | 50.0 | 12.68 | 6.68 | 3.91 | 2.61 | 2.95 | 18.13 | 10.68 | 6.93 | 5.00 | 5.37 | 0.34 | 0.61 | 4.44 | 6.98 @100F |
| 1990 | 20.6 | 27.3 | 20.6 | 5.65 | 3.55 | 2.53 | 2.00 | 2.31 | 9.10 | 6.37 | 4.89 | 4.05 | 4.79 | 0.27 | 0.49 | 4.44 | |
| 1995 | 0.0 | 0.0 | 0.0 | 1.72 | 1.48 | 1.29 | 1.14 | 1.21 | 3.46 | 2.99 | 2.62 | 2.33 | 2.82 | 0.23 | 0.43 | 3.90 | |
| 1995 | 0.0 | 100.0 | 0.0 | 1.95 | 1.72 | 1.53 | 1.37 | 1.60 | 3.54 | 3.22 | 2.95 | 2.73 | 3.51 | 0.26 | 0.49 | 3.90 | 5.93 @ 0F |
| 1995 | 100.0 | 0.0 | 100.0 | 22.07 | 9.94 | 4.69 | 2.40 | 2.91 | 29.40 | 14.25 | 7.32 | 4.10 | 4.23 | 0.38 | 0.73 | 3.90 | 5.39 @ 25F |
| 1995 | 50.0 | 0.0 | 50.0 | 9.60 | 4.75 | 2.59 | 1.62 | 1.85 | 13.52 | 7.35 | 4.42 | 3.00 | 3.33 | 0.29 | 0.55 | 3.90 | 4.96 @ 50F |
| 1995 | 0.0 | 50.0 | 0.0 | 1.78 | 1.55 | 1.37 | 1.22 | 1.35 | 3.44 | 3.04 | 2.72 | 2.46 | 3.05 | 0.24 | 0.45 | 3.90 | 4.61 @ 75F |
| 1995 | 50.0 | 50.0 | 50.0 | 12.01 | 5.83 | 3.11 | 1.89 | 2.25 | 16.47 | 8.74 | 5.13 | 3.42 | 3.87 | 0.32 | 0.61 | 3.90 | 4.98 @100F |
| 1995 | 20.6 | 27.3 | 20.6 | 4.98 | 2.85 | 1.87 | 1.38 | 1.55 | 7.56 | 4.80 | 3.41 | 2.67 | 3.16 | 0.26 | 0.49 | 3.90 | |
| 2000 | 0.0 | 0.0 | 0.0 | 1.54 | 1.31 | 1.14 | 1.00 | 1.00 | 2.70 | 2.30 | 1.99 | 1.75 | 1.88 | 0.23 | 0.45 | 3.71 | |
| 2000 | 0.0 | 100.0 | 0.0 | 1.78 | 1.55 | 1.36 | 1.21 | 1.36 | 2.94 | 2.58 | 2.29 | 2.05 | 2.43 | 0.27 | 0.51 | 3.71 | 5.36 @ 0F |
| 2000 | 100.0 | 0.0 | 100.0 | 21.14 | 9.37 | 4.32 | 2.16 | 2.72 | 28.08 | 12.78 | 6.11 | 3.20 | 3.77 | 0.38 | 0.75 | 3.71 | 4.82 @ 25F |
| 2000 | 50.0 | 0.0 | 50.0 | 9.13 | 4.42 | 2.36 | 1.44 | 1.66 | 12.51 | 6.34 | 3.57 | 2.29 | 2.59 | 0.29 | 0.56 | 3.71 | 4.40 @ 50F |
| 2000 | 0.0 | 50.0 | 0.0 | 1.61 | 1.39 | 1.21 | 1.07 | 1.13 | 2.75 | 2.38 | 2.08 | 1.85 | 2.07 | 0.24 | 0.46 | 3.71 | 4.06 @ 75F |
| 2000 | 50.0 | 50.0 | 50.0 | 11.46 | 5.46 | 2.84 | 1.68 | 2.04 | 15.51 | 7.68 | 4.20 | 2.63 | 3.10 | 0.32 | 0.63 | 3.71 | 4.39 @100F |
| 2000 | 20.6 | 27.3 | 20.6 | 4.68 | 2.62 | 1.68 | 1.22 | 1.34 | 6.74 | 3.99 | 2.68 | 2.02 | 2.27 | 0.26 | 0.50 | 3.71 | |

TABLE 22 : THC AT 35.0 MPH.

TABLE 23

HIGH ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 50.0 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | LDGV | | | | | LDGT | | | | | -LDDV- | -LDDT- | -HDDV- | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0°F | 25°F | 50°F | 75°F | 100°F | 0°F | 25°F | 50°F | 75°F | 100°F | 0-100F | 0-100F | 0-100F | |
| 1980 | 0.0 | 0.0 | 0.0 | 5.98 | 5.73 | 5.51 | 5.33 | 5.87 | 9.56 | 9.21 | 8.91 | 8.65 | 9.26 | 0.44 | 0.93 | 4.95 | 15.81 @ 0F |
| 1980 | 0.0 | 100.0 | 0.0 | 5.72 | 5.74 | 5.78 | 5.82 | 6.88 | 9.38 | 9.37 | 9.38 | 9.39 | 10.74 | 0.45 | 0.95 | 4.95 | 15.08 @ 25F |
| 1980 | 100.0 | 0.0 | 100.0 | 27.02 | 16.78 | 10.95 | 7.63 | 6.53 | 42.05 | 26.22 | 17.18 | 12.00 | 10.19 | 0.73 | 1.53 | 4.95 | 14.44 @ 50F |
| 1980 | 50.0 | 0.0 | 50.0 | 14.70 | 10.30 | 7.75 | 6.27 | 6.13 | 23.17 | 16.33 | 12.36 | 10.03 | 9.63 | 0.55 | 1.16 | 4.95 | 13.89 @ 75F |
| 1980 | 0.0 | 50.0 | 0.0 | 5.85 | 5.71 | 5.60 | 5.52 | 6.27 | 9.46 | 9.25 | 9.08 | 8.94 | 9.85 | 0.43 | 0.92 | 4.95 | 14.40 @100F |
| 1980 | 50.0 | 50.0 | 50.0 | 16.37 | 11.26 | 8.36 | 6.73 | 6.71 | 25.71 | 17.80 | 13.28 | 10.69 | 10.46 | 0.59 | 1.24 | 4.95 | |
| 1980 | 20.6 | 27.3 | 20.6 | 9.48 | 7.59 | 6.48 | 5.82 | 6.19 | 15.08 | 12.15 | 10.41 | 9.37 | 9.73 | 0.48 | 1.02 | 4.95 | |
| 1985 | 0.0 | 0.0 | 0.0 | 3.53 | 3.29 | 3.09 | 2.93 | 3.39 | 6.47 | 6.04 | 5.69 | 5.41 | 6.30 | 0.24 | 0.46 | 4.41 | 13.05 @ 0F |
| 1985 | 0.0 | 100.0 | 0.0 | 3.44 | 3.36 | 3.30 | 3.27 | 4.01 | 6.13 | 6.06 | 6.01 | 5.97 | 7.37 | 0.28 | 0.49 | 4.41 | 12.67 @ 25F |
| 1985 | 100.0 | 0.0 | 100.0 | 20.10 | 11.28 | 6.80 | 4.48 | 4.09 | 30.06 | 18.10 | 11.48 | 7.79 | 6.60 | 0.42 | 0.76 | 4.41 | 12.35 @ 50F |
| 1985 | 50.0 | 0.0 | 50.0 | 10.12 | 6.47 | 4.56 | 3.54 | 3.65 | 16.06 | 10.94 | 8.03 | 6.35 | 6.39 | 0.31 | 0.57 | 4.41 | 12.07 @ 75F |
| 1985 | 0.0 | 50.0 | 0.0 | 3.47 | 3.29 | 3.16 | 3.05 | 3.62 | 6.29 | 6.02 | 5.79 | 5.61 | 6.69 | 0.25 | 0.47 | 4.41 | 12.63 @100F |
| 1985 | 50.0 | 50.0 | 50.0 | 11.77 | 7.32 | 5.05 | 3.87 | 4.05 | 18.09 | 12.08 | 8.74 | 6.88 | 6.99 | 0.35 | 0.63 | 4.41 | |
| 1985 | 20.6 | 27.3 | 20.6 | 6.19 | 4.59 | 3.73 | 3.25 | 3.62 | 10.29 | 8.03 | 6.70 | 5.90 | 6.55 | 0.28 | 0.51 | 4.41 | |
| 1988 | 0.0 | 0.0 | 0.0 | 2.53 | 2.30 | 2.12 | 1.97 | 2.61 | 4.99 | 4.57 | 4.23 | 3.96 | 5.23 | 0.20 | 0.36 | 3.76 | 8.46 @ 0F |
| 1988 | 0.0 | 100.0 | 0.0 | 2.55 | 2.42 | 2.32 | 2.24 | 3.12 | 4.78 | 4.64 | 4.53 | 4.44 | 6.17 | 0.23 | 0.39 | 3.76 | 8.07 @ 25F |
| 1988 | 100.0 | 0.0 | 100.0 | 18.39 | 9.48 | 5.27 | 3.24 | 3.44 | 26.62 | 15.14 | 9.14 | 5.96 | 5.59 | 0.34 | 0.60 | 3.76 | 7.75 @ 50F |
| 1988 | 50.0 | 0.0 | 50.0 | 8.73 | 5.10 | 3.34 | 2.46 | 2.92 | 13.62 | 8.78 | 6.18 | 4.74 | 5.34 | 0.25 | 0.45 | 3.76 | 7.48 @ 75F |
| 1988 | 0.0 | 50.0 | 0.0 | 2.51 | 2.33 | 2.18 | 2.06 | 2.79 | 4.86 | 4.56 | 4.32 | 4.13 | 5.56 | 0.21 | 0.37 | 3.76 | 9.13 @100F |
| 1988 | 50.0 | 50.0 | 50.0 | 10.47 | 5.95 | 3.79 | 2.74 | 3.28 | 15.70 | 9.89 | 6.84 | 5.20 | 5.88 | 0.28 | 0.50 | 3.76 | |
| 1988 | 20.6 | 27.3 | 20.6 | 5.05 | 3.46 | 2.65 | 2.22 | 2.84 | 8.45 | 6.29 | 5.08 | 4.37 | 5.45 | 0.23 | 0.40 | 3.76 | |
| 1990 | 0.0 | 0.0 | 0.0 | 2.08 | 1.86 | 1.69 | 1.55 | 1.78 | 4.24 | 3.83 | 3.51 | 3.25 | 3.94 | 0.19 | 0.34 | 3.41 | 6.77 @ 0F |
| 1990 | 0.0 | 100.0 | 0.0 | 2.16 | 2.01 | 1.88 | 1.78 | 2.17 | 4.11 | 3.94 | 3.79 | 3.67 | 4.70 | 0.21 | 0.37 | 3.41 | 6.39 @ 25F |
| 1990 | 100.0 | 0.0 | 100.0 | 17.88 | 8.77 | 4.62 | 2.71 | 2.84 | 25.28 | 13.75 | 7.98 | 5.04 | 4.57 | 0.31 | 0.56 | 3.41 | 6.09 @ 50F |
| 1990 | 50.0 | 0.0 | 50.0 | 8.22 | 4.54 | 2.82 | 1.99 | 2.17 | 12.54 | 7.74 | 5.26 | 3.94 | 4.16 | 0.23 | 0.42 | 3.41 | 5.84 @ 75F |
| 1990 | 0.0 | 50.0 | 0.0 | 2.08 | 1.90 | 1.75 | 1.63 | 1.92 | 4.14 | 3.84 | 3.59 | 3.40 | 4.21 | 0.19 | 0.35 | 3.41 | 6.18 @100F |
| 1990 | 50.0 | 50.0 | 50.0 | 10.02 | 5.39 | 3.25 | 2.24 | 2.50 | 14.70 | 8.84 | 5.89 | 4.36 | 4.64 | 0.26 | 0.47 | 3.41 | |
| 1990 | 20.6 | 27.3 | 20.6 | 4.59 | 2.97 | 2.18 | 1.77 | 2.01 | 7.58 | 5.43 | 4.27 | 3.61 | 4.17 | 0.21 | 0.38 | 3.41 | |
| 1995 | 0.0 | 0.0 | 0.0 | 1.47 | 1.28 | 1.14 | 1.02 | 1.07 | 2.94 | 2.58 | 2.30 | 2.07 | 2.45 | 0.18 | 0.33 | 2.99 | 5.01 @ 0F |
| 1995 | 0.0 | 100.0 | 0.0 | 1.64 | 1.46 | 1.32 | 1.20 | 1.37 | 3.00 | 2.75 | 2.55 | 2.38 | 2.98 | 0.20 | 0.37 | 2.99 | 4.64 @ 25F |
| 1995 | 100.0 | 0.0 | 100.0 | 17.09 | 7.78 | 3.74 | 1.99 | 2.38 | 22.96 | 11.28 | 5.93 | 3.44 | 3.54 | 0.29 | 0.56 | 2.99 | 4.35 @ 50F |
| 1995 | 50.0 | 0.0 | 50.0 | 7.52 | 3.79 | 2.14 | 1.39 | 1.57 | 10.71 | 5.95 | 3.69 | 2.59 | 2.84 | 0.22 | 0.42 | 2.99 | 4.12 @ 75F |
| 1995 | 0.0 | 50.0 | 0.0 | 1.52 | 1.34 | 1.20 | 1.08 | 1.18 | 2.93 | 2.62 | 2.37 | 2.17 | 2.63 | 0.18 | 0.34 | 2.99 | 4.37 @100F |
| 1995 | 50.0 | 50.0 | 50.0 | 9.37 | 4.62 | 2.53 | 1.60 | 1.87 | 12.98 | 7.02 | 4.24 | 2.91 | 3.26 | 0.25 | 0.47 | 2.99 | |
| 1995 | 20.6 | 27.3 | 20.6 | 3.97 | 2.34 | 1.58 | 1.21 | 1.33 | 6.11 | 3.98 | 2.91 | 2.34 | 2.71 | 0.20 | 0.37 | 2.99 | |
| 2000 | 0.0 | 0.0 | 0.0 | 1.30 | 1.13 | 1.00 | 0.89 | 0.89 | 2.28 | 1.97 | 1.73 | 1.55 | 1.65 | 0.18 | 0.34 | 2.85 | 4.50 @ 0F |
| 2000 | 0.0 | 100.0 | 0.0 | 1.49 | 1.31 | 1.17 | 1.05 | 1.17 | 2.46 | 2.19 | 1.97 | 1.78 | 2.07 | 0.20 | 0.39 | 2.85 | 4.14 @ 25F |
| 2000 | 100.0 | 0.0 | 100.0 | 16.36 | 7.32 | 3.44 | 1.78 | 2.21 | 21.77 | 10.02 | 4.90 | 2.66 | 3.10 | 0.29 | 0.58 | 2.85 | 3.85 @ 50F |
| 2000 | 50.0 | 0.0 | 50.0 | 7.13 | 3.52 | 1.94 | 1.23 | 1.40 | 9.82 | 5.07 | 2.95 | 1.97 | 2.20 | 0.22 | 0.43 | 2.85 | 3.62 @ 75F |
| 2000 | 0.0 | 50.0 | 0.0 | 1.36 | 1.19 | 1.05 | 0.95 | 0.99 | 2.32 | 2.03 | 1.81 | 1.63 | 1.80 | 0.19 | 0.36 | 2.85 | 3.84 @100F |
| 2000 | 50.0 | 50.0 | 50.0 | 8.92 | 4.31 | 2.31 | 1.42 | 1.69 | 12.12 | 6.11 | 3.43 | 2.22 | 2.59 | 0.25 | 0.48 | 2.85 | |
| 2000 | 20.6 | 27.3 | 20.6 | 3.72 | 2.14 | 1.41 | 1.06 | 1.15 | 5.38 | 3.27 | 2.27 | 1.76 | 1.95 | 0.20 | 0.38 | 2.85 | |

TABLE 23 : THC AT 50.0 MPH.

TABLE 24

HIGH ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE) AT 55.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | LDGV 0°F | LDGV 25°F | LDGV 50°F | LDGV 75°F | LDGV 100°F | LDGT 0°F | LDGT 25°F | LDGT 50°F | LDGT 75°F | LDGT 100°F | -LDDV- 0-100F | -LDDT- 0-100F | -HDDV- 0-100F | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 5.85 | 5.62 | 5.42 | 5.29 | 5.74 | 9.38 | 9.05 | 8.77 | 8.53 | 9.09 | 0.42 | 0.89 | 4.74 | 15.54 @ 0F |
| 1980 | 0.0 | 100.0 | 0.0 | 5.61 | 5.63 | 5.67 | 5.19 | 5.70 | 9.22 | 9.22 | 9.22 | 9.24 | 10.51 | 0.43 | 0.90 | 4.74 | 14.84 @ 25F |
| 1980 | 100.0 | 0.0 | 100.0 | 25.89 | 16.14 | 10.59 | 7.43 | 6.39 | 40.66 | 25.44 | 16.73 | 11.75 | 10.01 | 0.70 | 1.46 | 4.74 | 14.23 @ 50F |
| 1980 | 50.0 | 0.0 | 50.0 | 14.17 | 9.98 | 7.56 | 6.14 | 6.00 | 22.51 | 15.92 | 12.10 | 9.86 | 9.46 | 0.52 | 1.11 | 4.74 | 13.71 @ 75F |
| 1980 | 0.0 | 50.0 | 0.0 | 5.73 | 5.60 | 5.51 | 5.43 | 6.12 | 9.29 | 9.10 | 8.94 | 8.81 | 9.66 | 0.41 | 0.88 | 4.74 | 14.20 @100F |
| 1980 | 50.0 | 50.0 | 50.0 | 15.75 | 10.89 | [illegible] | 6.57 | 6.54 | 24.94 | 17.33 | 12.98 | 10.49 | 10.26 | 0.56 | 1.18 | 4.74 | |
| 1980 | 20.6 | 27.3 | 20.6 | 9.19 | 7.40 | 6.34 | 5.71 | 6.05 | 14.71 | 11.89 | 10.23 | 9.22 | 9.55 | 0.46 | 0.97 | 4.74 | |
| 1985 | 0.0 | 0.0 | 0.0 | 3.41 | 3.19 | 3.01 | 2.87 | 3.28 | 6.25 | 5.87 | 5.55 | 5.29 | 6.09 | 0.23 | 0.44 | 4.22 | 12.89 @ 0F |
| 1985 | 0.0 | 100.0 | 0.0 | 3.32 | 3.25 | 3.20 | 3.17 | 3.86 | 5.94 | 5.89 | 5.84 | 5.81 | 7.10 | 0.27 | 0.47 | 4.22 | 12.54 @ 25F |
| 1985 | 100.0 | 0.0 | 100.0 | 18.68 | 10.57 | 6.44 | 4.30 | 3.93 | 28.42 | 17.21 | 10.99 | 7.52 | 6.40 | 0.40 | 0.73 | 4.22 | 12.23 @ 50F |
| 1985 | 50.0 | 0.0 | 50.0 | 9.50 | 6.13 | 4.37 | 3.43 | 3.52 | 15.29 | 10.48 | 7.75 | 6.18 | 6.19 | 0.30 | 0.55 | 4.22 | 11.96 @ 75F |
| 1985 | 0.0 | 50.0 | 0.0 | 3.35 | 3.19 | 3.07 | 2.98 | 3.49 | 6.09 | 5.84 | 5.64 | 5.48 | 6.46 | 0.24 | 0.45 | 4.22 | 12.50 @100F |
| 1985 | 50.0 | 50.0 | 50.0 | 11.00 | 6.91 | 4.82 | 3.73 | 3.89 | 17.18 | 11.55 | 8.41 | 6.66 | 6.75 | 0.33 | 0.60 | 4.22 | |
| 1985 | 20.6 | 27.3 | 20.6 | 5.86 | 4.39 | 3.60 | 3.16 | 3.49 | 9.86 | 7.74 | 6.50 | 5.75 | 6.33 | 0.26 | 0.49 | 4.22 | |
| 1988 | 0.0 | 0.0 | 0.0 | 2.42 | 2.21 | 2.05 | 1.92 | 2.52 | 4.78 | 4.40 | 4.10 | 3.85 | 5.03 | 0.19 | 0.34 | 3.60 | 8.34 @ 0F |
| 1988 | 0.0 | 100.0 | 0.0 | 2.43 | 2.32 | 2.23 | 2.16 | 2.99 | 4.59 | 4.47 | 4.37 | 4.29 | 5.90 | 0.22 | 0.38 | 3.60 | 7.97 @ 25F |
| 1988 | 100.0 | 0.0 | 100.0 | 16.84 | 8.75 | 4.92 | 3.07 | 3.28 | 24.79 | 14.20 | 8.65 | 5.70 | 5.38 | 0.32 | 0.57 | 3.60 | 7.66 @ 50F |
| 1988 | 50.0 | 0.0 | 50.0 | 8.07 | 4.77 | 3.16 | 2.66 | 2.80 | 12.78 | 8.32 | 5.91 | 5.04 | 5.14 | 0.24 | 0.43 | 3.60 | 8.58 @ 75F |
| 1988 | 0.0 | 50.0 | 0.0 | 2.40 | 2.23 | 2.10 | 2.27 | 2.69 | 4.67 | 4.40 | 4.18 | 4.43 | 5.34 | 0.20 | 0.35 | 3.60 | 9.02 @100F |
| 1988 | 50.0 | 50.0 | 50.0 | 9.64 | 5.53 | 3.57 | 2.93 | 3.13 | 14.69 | 9.34 | 6.51 | 5.48 | 5.64 | 0.27 | 0.47 | 3.60 | |
| 1988 | 20.6 | 27.3 | 20.6 | 4.72 | 3.27 | 2.53 | 2.43 | 2.72 | 7.99 | 6.00 | 4.88 | 4.67 | 5.24 | 0.22 | 0.38 | 3.60 | |
| 1990 | 0.0 | 0.0 | 0.0 | 1.97 | 1.78 | 1.62 | 1.50 | 1.71 | 4.04 | 3.68 | 3.38 | 3.15 | 3.77 | 0.18 | 0.32 | 3.26 | 6.66 @ 0F |
| 1990 | 0.0 | 100.0 | 0.0 | 2.05 | 1.91 | 1.80 | 1.71 | 2.06 | 3.92 | 3.77 | 3.64 | 3.53 | 4.47 | 0.20 | 0.36 | 3.26 | 6.30 @ 25F |
| 1990 | 100.0 | 0.0 | 100.0 | 16.27 | 8.03 | 4.28 | 2.55 | 2.66 | 23.33 | 12.78 | 7.49 | 4.79 | 4.35 | 0.30 | 0.54 | 3.26 | 6.01 @ 50F |
| 1990 | 50.0 | 0.0 | 50.0 | 7.53 | 4.20 | 2.65 | 1.90 | 2.06 | 11.66 | 7.27 | 5.00 | 3.78 | 3.97 | 0.22 | 0.41 | 3.26 | 5.78 @ 75F |
| 1990 | 0.0 | 50.0 | 0.0 | 1.98 | 1.81 | 1.68 | 1.57 | 1.83 | 3.96 | 3.68 | 3.46 | 3.28 | 4.02 | 0.19 | 0.33 | 3.26 | 6.10 @100F |
| 1990 | 50.0 | 50.0 | 50.0 | 9.16 | 4.97 | 3.04 | 2.13 | 2.36 | 13.63 | 8.28 | 5.57 | 4.16 | 4.41 | 0.25 | 0.45 | 3.26 | |
| 1990 | 20.6 | 27.3 | 20.6 | 4.25 | 2.79 | 2.07 | 1.70 | 1.92 | 7.11 | 5.15 | 4.08 | 3.48 | 3.99 | 0.20 | 0.36 | 3.26 | |
| 1995 | 0.0 | 0.0 | 0.0 | 1.38 | 1.22 | 1.09 | 0.98 | 1.03 | 2.77 | 2.45 | 2.19 | 1.99 | 2.33 | 0.17 | 0.32 | 2.87 | 4.92 @ 0F |
| 1995 | 0.0 | 100.0 | 0.0 | 1.54 | 1.38 | 1.25 | 1.14 | 1.30 | 2.83 | 2.60 | 2.42 | 2.27 | 2.81 | 0.19 | 0.36 | 2.87 | 4.57 @ 25F |
| 1995 | 100.0 | 0.0 | 100.0 | 15.47 | 7.07 | 3.44 | 1.85 | 2.20 | 20.87 | 10.32 | 5.48 | 3.23 | 3.31 | 0.28 | 0.54 | 2.87 | 4.29 @ 50F |
| 1995 | 50.0 | 0.0 | 50.0 | 6.84 | 3.48 | 1.99 | 1.31 | 1.48 | 9.80 | 5.49 | 3.45 | 2.46 | 2.69 | 0.21 | 0.40 | 2.87 | 4.07 @ 75F |
| 1995 | 0.0 | 50.0 | 0.0 | 1.43 | 1.27 | 1.14 | 1.04 | 1.12 | 2.76 | 2.48 | 2.26 | 2.08 | 2.49 | 0.18 | 0.33 | 2.87 | 4.31 @100F |
| 1995 | 50.0 | 50.0 | 50.0 | 8.50 | 4.23 | 2.34 | 1.50 | 1.75 | 11.85 | 6.46 | 3.95 | 2.75 | 3.06 | 0.24 | 0.45 | 2.87 | |
| 1995 | 20.6 | 27.3 | 20.6 | 3.64 | 2.17 | 1.48 | 1.15 | 1.26 | 5.64 | 3.71 | 2.74 | 2.23 | 2.56 | 0.19 | 0.36 | 2.87 | |
| 2000 | 0.0 | 0.0 | 0.0 | 1.23 | 1.07 | 0.95 | 0.86 | 0.86 | 2.14 | 1.87 | 1.65 | 1.48 | 1.58 | 0.17 | 0.33 | 2.73 | 4.41 @ 0F |
| 2000 | 0.0 | 100.0 | 0.0 | 1.39 | 1.24 | 1.11 | 1.00 | 1.10 | 2.31 | 2.06 | 1.86 | 1.70 | 1.95 | 0.20 | 0.37 | 2.73 | 4.07 @ 25F |
| 2000 | 100.0 | 0.0 | 100.0 | 14.80 | 6.65 | 3.15 | 1.66 | 2.05 | 19.71 | 9.12 | 4.51 | 2.49 | 2.88 | 0.28 | 0.55 | 2.73 | 3.79 @ 50F |
| 2000 | 50.0 | 0.0 | 50.0 | 6.48 | 3.23 | 1.80 | 1.16 | 1.31 | 8.94 | 4.66 | 2.74 | 1.86 | 2.07 | 0.21 | 0.41 | 2.73 | 3.58 @ 75F |
| 2000 | 0.0 | 50.0 | 0.0 | 1.28 | 1.12 | 1.00 | 0.91 | 0.95 | 2.18 | 1.92 | 1.72 | 1.55 | 1.71 | 0.18 | 0.34 | 2.73 | 3.79 @100F |
| 2000 | 50.0 | 50.0 | 50.0 | 8.10 | 3.94 | 2.13 | 1.33 | 1.58 | 11.01 | 5.59 | 3.18 | 2.09 | 2.42 | 0.24 | 0.46 | 2.73 | |
| 2000 | 20.6 | 27.3 | 20.6 | 3.40 | 1.98 | 1.32 | 1.01 | 1.09 | 4.94 | 3.04 | 2.13 | 1.67 | 1.85 | 0.19 | 0.37 | 2.73 | |

TABLE 24 : THC AT 55.0 MPH.

## TABLE 25

## HIGH ALTITUDE

### CO EMISSION FACTORS (GRAMS/MILE) AT 5.0 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | ----- LDGV | | | | ----- | ----- LDGT | | | | ----- | -LDDV- | -LDDT- | -HDDV- | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0°F | 25°F | 50°F | 75°F | 100°F | 0°F | 25°F | 50°F | 75°F | 100°F | 0-100F | 0-100F | 0-100F | |
| 1980 | 0.0 | 0.0 | 0.0 | 243.53 | 212.24 | 187.19 | 167.07 | 382.28 | 329.13 | 291.67 | 260.81 | 235.39 | 464.91 | 4.37 | 7.23 | 61.34 | 1062.42 @ 0F |
| 1980 | 0.0 | 100.0 | 0.0 | 144.69 | 147.10 | 150.48 | 154.87 | 304.48 | 197.31 | 202.42 | 208.13 | 214.50 | 407.16 | 7.38 | 12.54 | 61.34 | 968.94 @ 25F |
| 1980 | 100.0 | 0.0 | 100.0 | 1783.15 | 1024.21 | 592.11 | 343.80 | 214.49 | 2265.40 | 1316.78 | 770.88 | 454.83 | 269.86 | 9.11 | 15.37 | 61.34 | 884.48 @ 50F |
| 1980 | 50.0 | 0.0 | 50.0 | 875.42 | 544.71 | 351.77 | 237.34 | 305.26 | 1139.05 | 719.72 | 472.47 | 324.68 | 375.17 | 6.11 | 10.23 | 61.34 | 808.14 @ 75F |
| 1980 | 0.0 | 50.0 | 0.0 | 197.40 | 180.76 | 168.10 | 158.69 | 342.90 | 267.89 | 249.11 | 234.33 | 222.91 | 434.06 | 5.46 | 9.17 | 61.34 | 1380.90 @100F |
| 1980 | 50.0 | 50.0 | 50.0 | 963.92 | 585.65 | 371.30 | 249.34 | 259.49 | 1231.35 | 759.60 | 489.51 | 334.67 | 338.51 | 8.25 | 13.95 | 61.34 | |
| 1980 | 20.6 | 27.3 | 20.6 | 477.17 | 331.22 | 244.15 | 191.22 | 329.17 | 627.60 | 443.85 | 333.07 | 265.12 | 411.21 | 5.67 | 9.49 | 61.34 | |
| 1985 | 0.0 | 0.0 | 0.0 | 203.74 | 156.45 | 123.20 | 99.43 | 250.95 | 292.95 | 243.03 | 203.83 | 172.79 | 429.23 | 3.92 | 6.46 | 52.21 | 849.95 @ 0F |
| 1985 | 0.0 | 100.0 | 0.0 | 141.53 | 124.39 | 112.08 | 103.51 | 197.92 | 166.26 | 162.58 | 160.30 | 159.20 | 323.93 | 6.14 | 11.30 | 52.21 | 774.69 @ 25F |
| 1985 | 100.0 | 0.0 | 100.0 | 1287.93 | 768.56 | 451.60 | 243.34 | 158.48 | 2014.05 | 1134.09 | 639.71 | 356.39 | 214.63 | 8.05 | 13.83 | 52.21 | 708.89 @ 50F |
| 1985 | 50.0 | 0.0 | 50.0 | 637.46 | 400.25 | 252.97 | 155.20 | 206.88 | 991.28 | 603.14 | 378.35 | 244.48 | 331.35 | 5.44 | 9.18 | 52.21 | 651.17 @ 75F |
| 1985 | 0.0 | 50.0 | 0.0 | 172.87 | 139.12 | 115.33 | 98.46 | 223.15 | 233.84 | 204.16 | 181.15 | 163.26 | 376.89 | 4.72 | 8.23 | 52.21 | 1150.36 @100F |
| 1985 | 50.0 | 50.0 | 50.0 | 714.73 | 446.47 | 281.84 | 173.43 | 178.20 | 1090.16 | 648.33 | 400.01 | 257.79 | 269.28 | 7.09 | 12.56 | 52.21 | |
| 1985 | 20.6 | 27.3 | 20.6 | 364.39 | 246.73 | 171.96 | 121.66 | 217.66 | 546.64 | 369.25 | 262.87 | 196.88 | 360.49 | 4.97 | 8.52 | 52.21 | |
| 1988 | 0.0 | 0.0 | 0.0 | 199.11 | 140.34 | 101.24 | 74.89 | 201.15 | 260.03 | 204.10 | 162.84 | 131.92 | 373.02 | 3.24 | 5.54 | 47.90 | 558.24 @ 0F |
| 1988 | 0.0 | 100.0 | 0.0 | 149.59 | 121.83 | 101.29 | 86.17 | 164.26 | 157.17 | 143.97 | 134.23 | 127.16 | 278.63 | 5.08 | 9.72 | 47.90 | 501.89 @ 25F |
| 1988 | 100.0 | 0.0 | 100.0 | 1081.19 | 658.48 | 391.50 | 203.26 | 142.41 | 1770.35 | 997.43 | 559.09 | 296.27 | 192.34 | 6.76 | 11.89 | 47.90 | 452.93 @ 50F |
| 1988 | 50.0 | 0.0 | 50.0 | 547.06 | 343.99 | 214.64 | 124.22 | 171.82 | 865.82 | 520.84 | 319.59 | 195.42 | 290.06 | 4.53 | 7.88 | 47.90 | 410.29 @ 75F |
| 1988 | 0.0 | 50.0 | 0.0 | 173.39 | 128.76 | 98.27 | 77.24 | 180.85 | 211.19 | 174.16 | 146.89 | 126.58 | 325.87 | 3.90 | 7.07 | 47.90 | 815.24 @100F |
| 1988 | 50.0 | 50.0 | 50.0 | 615.39 | 390.15 | 246.39 | 144.71 | 153.33 | 963.75 | 570.70 | 346.66 | 211.71 | 235.48 | 5.92 | 10.81 | 47.90 | |
| 1988 | 20.6 | 27.3 | 20.6 | 327.40 | 217.29 | 145.96 | 96.29 | 177.98 | 481.34 | 317.38 | 218.25 | 154.93 | 313.23 | 4.12 | 7.32 | 47.90 | |
| 1990 | 0.0 | 0.0 | 0.0 | 200.14 | 134.76 | 92.31 | 64.50 | 141.09 | 247.09 | 185.83 | 142.44 | 111.19 | 289.86 | 3.01 | 5.30 | 45.94 | 425.30 @ 0F |
| 1990 | 0.0 | 100.0 | 0.0 | 156.27 | 122.70 | 97.75 | 79.23 | 127.52 | 157.90 | 137.96 | 123.08 | 112.03 | 219.76 | 4.72 | 9.31 | 45.94 | 378.66 @ 25F |
| 1990 | 100.0 | 0.0 | 100.0 | 973.70 | 603.43 | 363.69 | 186.85 | 129.03 | 1637.92 | 919.86 | 512.98 | 263.30 | 166.98 | 6.31 | 11.39 | 45.94 | 338.25 @ 50F |
| 1990 | 50.0 | 0.0 | 50.0 | 502.83 | 317.71 | 197.79 | 111.39 | 132.05 | 800.92 | 476.76 | 288.03 | 169.63 | 232.23 | 4.23 | 7.55 | 45.94 | 303.17 @ 75F |
| 1990 | 0.0 | 50.0 | 0.0 | 176.63 | 125.89 | 91.70 | 68.45 | 131.54 | 204.04 | 161.20 | 130.61 | 108.47 | 254.01 | 3.63 | 6.77 | 45.94 | 483.13 @100F |
| 1990 | 50.0 | 50.0 | 50.0 | 564.99 | 363.06 | 230.72 | 133.04 | 128.28 | 897.91 | 528.91 | 318.03 | 187.66 | 193.37 | 5.51 | 10.35 | 45.94 | |
| 1990 | 20.6 | 27.3 | 20.6 | 311.08 | 204.70 | 135.07 | 85.78 | 132.09 | 450.24 | 291.41 | 195.51 | 133.56 | 246.61 | 3.84 | 7.01 | 45.94 | |
| 1995 | 0.0 | 0.0 | 0.0 | 199.70 | 126.28 | 80.10 | 51.01 | 82.17 | 230.80 | 156.21 | 107.31 | 74.91 | 172.41 | 2.81 | 5.13 | 43.44 | 268.83 @ 0F |
| 1995 | 0.0 | 100.0 | 0.0 | 163.48 | 122.39 | 91.87 | 69.19 | 93.30 | 166.97 | 132.23 | 106.24 | 86.76 | 145.82 | 4.40 | 9.05 | 43.44 | 235.14 @ 25F |
| 1995 | 100.0 | 0.0 | 100.0 | 800.19 | 515.52 | 320.03 | 162.52 | 117.09 | 1383.03 | 768.60 | 424.72 | 203.92 | 138.43 | 5.94 | 11.06 | 43.44 | 206.06 @ 50F |
| 1995 | 50.0 | 0.0 | 50.0 | 432.26 | 277.12 | 173.01 | 93.77 | 93.56 | 683.23 | 395.69 | 230.65 | 124.14 | 153.64 | 3.96 | 7.32 | 43.44 | 180.95 @ 75F |
| 1995 | 0.0 | 50.0 | 0.0 | 179.26 | 120.91 | 82.35 | 56.69 | 84.10 | 198.38 | 141.92 | 103.64 | 77.39 | 156.74 | 3.39 | 6.56 | 43.44 | 253.75 @100F |
| 1995 | 50.0 | 50.0 | 50.0 | 481.84 | 318.96 | 205.95 | 115.86 | 105.19 | 775.00 | 450.41 | 265.48 | 145.34 | 142.13 | 5.17 | 10.06 | 43.44 | |
| 1995 | 20.6 | 27.3 | 20.6 | 283.60 | 184.98 | 119.27 | 71.54 | 87.81 | 398.16 | 246.33 | 155.70 | 96.34 | 156.09 | 3.59 | 6.79 | 43.44 | |
| 2000 | 0.0 | 0.0 | 0.0 | 193.96 | 121.19 | 75.72 | 47.31 | 66.90 | 222.93 | 141.28 | 89.84 | 57.37 | 97.17 | 2.79 | 5.12 | 42.13 | 215.91 @ 0F |
| 2000 | 0.0 | 100.0 | 0.0 | 159.68 | 118.44 | 87.85 | 65.16 | 83.03 | 172.45 | 129.43 | 97.44 | 73.64 | 102.29 | 4.38 | 9.06 | 42.13 | 187.16 @ 25F |
| 2000 | 100.0 | 0.0 | 100.0 | 743.18 | 486.35 | 304.36 | 152.81 | 111.53 | 1225.89 | 676.79 | 372.86 | 171.32 | 122.50 | 5.94 | 11.06 | 42.13 | 162.42 @ 50F |
| 2000 | 50.0 | 0.0 | 50.0 | 406.32 | 262.62 | 164.28 | 87.80 | 82.61 | 614.71 | 349.79 | 199.58 | 100.91 | 104.29 | 3.95 | 7.31 | 42.13 | 141.12 @ 75F |
| 2000 | 0.0 | 50.0 | 0.0 | 174.46 | 116.42 | 78.24 | 52.97 | 71.28 | 196.12 | 132.29 | 90.14 | 62.10 | 96.26 | 3.36 | 6.56 | 42.13 | 178.88 @100F |
| 2000 | 50.0 | 50.0 | 50.0 | 451.43 | 302.39 | 196.11 | 108.98 | 97.28 | 699.17 | 403.11 | 235.15 | 122.48 | 112.40 | 5.16 | 10.06 | 42.13 | |
| 2000 | 20.6 | 27.3 | 20.6 | 270.11 | 176.37 | 113.26 | 66.90 | 75.65 | 368.51 | 221.60 | 134.83 | 77.70 | 99.51 | 3.57 | 6.79 | 42.13 | |

TABLE 25 : CO AT 5.0 MPH.

## TABLE 26

## HIGH ALTITUDE

### CO EMISSION FACTORS (GRAMS/MILE) AT 10.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | LDGV 0°F | 25°F | 50°F | 75°F | 100°F | LDGT 0°F | 25°F | 50°F | 75°F | 100°F | -LDDV- 0-100F | -LDDT- 0-100F | -HDDV- 0-100F | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 134.65 | 117.84 | 104.36 | 93.54 | 209.74 | 183.01 | 162.72 | 146.01 | 132.24 | 256.88 | 3.01 | 4.99 | 42.29 | |
| 1980 | 0.0 | 100.0 | 0.0 | 80.43 | 81.91 | 83.93 | 86.51 | 168.90 | 110.55 | 113.52 | 116.81 | 120.48 | 126.90 | 5.09 | 8.65 | 42.29 | 706.84 @ 0F |
| 1980 | 100.0 | 0.0 | 100.0 | 979.99 | 564.65 | 327.53 | 180.88 | 118.86 | 1248.24 | 728.10 | 427.89 | 253.51 | 150.75 | 6.28 | 10.60 | 42.29 | 644.65 @ 25F |
| 1980 | 50.0 | 0.0 | 50.0 | 482.37 | 301.22 | 195.29 | 132.34 | 167.99 | 629.35 | 399.22 | 263.20 | 181.68 | 208.01 | 4.22 | 7.05 | 42.29 | 588.46 @ 50F |
| 1980 | 0.0 | 50.0 | 0.0 | 109.34 | 100.49 | 93.77 | 88.80 | 188.97 | 149.33 | 139.26 | 131.34 | 125.26 | 240.71 | 3.77 | 6.32 | 42.29 | 537.66 @ 75F |
| 1980 | 50.0 | 50.0 | 50.0 | 530.21 | 323.28 | 205.73 | 138.69 | 143.88 | 679.39 | 420.81 | 272.35 | 187.00 | 188.83 | 5.69 | 9.62 | 42.29 | 918.73 @100F |
| 1980 | 20.6 | 27.3 | 20.6 | 263.27 | 183.48 | 135.81 | 106.82 | 181.26 | 347.55 | 246.83 | 186.02 | 148.67 | 227.98 | 3.91 | 6.55 | 42.29 | |
| 1985 | 0.0 | 0.0 | 0.0 | 109.43 | 84.32 | 66.64 | 54.00 | 135.03 | 158.82 | 132.10 | 111.09 | 94.45 | 231.80 | 2.70 | 4.46 | 36.00 | |
| 1985 | 0.0 | 100.0 | 0.0 | 75.79 | 66.79 | 60.36 | 55.91 | 106.82 | 90.14 | 88.30 | 87.21 | 86.74 | 175.83 | 4.23 | 7.79 | 36.00 | 565.48 @ 0F |
| 1985 | 100.0 | 0.0 | 100.0 | 691.70 | 412.92 | 242.80 | 131.13 | 85.30 | 1085.89 | 612.55 | 346.23 | 193.41 | 116.48 | 5.55 | 9.54 | 36.00 | 515.41 @ 25F |
| 1985 | 50.0 | 0.0 | 50.0 | 342.66 | 215.37 | 136.33 | 83.92 | 111.34 | 535.49 | 326.55 | 205.38 | 133.15 | 179.18 | 3.75 | 6.33 | 36.00 | 471.64 @ 50F |
| 1985 | 0.0 | 50.0 | 0.0 | 92.77 | 74.89 | 62.29 | 53.36 | 120.23 | 126.78 | 110.95 | 98.69 | 89.15 | 203.94 | 3.26 | 5.67 | 36.00 | 433.23 @ 75F |
| 1985 | 50.0 | 50.0 | 50.0 | 383.74 | 239.86 | 151.58 | 93.52 | 96.06 | 588.02 | 350.42 | 216.72 | 140.08 | 146.16 | 4.89 | 8.66 | 36.00 | 765.34 @100F |
| 1985 | 20.6 | 27.3 | 20.6 | 195.79 | 132.79 | 92.76 | 65.86 | 117.21 | 295.58 | 200.17 | 142.91 | 107.37 | 195.00 | 3.43 | 5.87 | 36.00 | |
| 1988 | 0.0 | 0.0 | 0.0 | 105.91 | 74.78 | 54.06 | 40.10 | 107.58 | 139.65 | [illegible] | 87.84 | 71.32 | 200.50 | 2.23 | 3.82 | 33.03 | |
| 1988 | 0.0 | 100.0 | 0.0 | 79.42 | 64.76 | 53.92 | 45.96 | 87.94 | 84.14 | [illegible] | 72.12 | 68.44 | 150.24 | 3.50 | 6.70 | 33.03 | 371.40 @ 0F |
| 1988 | 100.0 | 0.0 | 100.0 | 575.60 | 350.54 | 208.44 | 108.33 | 76.03 | 947.27 | [illegible] | 299.69 | 159.11 | 103.53 | 4.66 | 8.20 | 33.03 | 333.91 @ 25F |
| 1988 | 50.0 | 0.0 | 50.0 | 291.31 | 183.24 | 114.41 | 66.33 | 91.85 | 463.90 | [illegible] | 171.72 | 105.27 | 155.97 | 3.13 | 5.43 | 33.03 | 301.34 @ 50F |
| 1988 | 0.0 | 50.0 | 0.0 | 92.16 | 68.55 | 52.41 | 41.29 | 96.77 | 113.31 | 93.63 | 79.12 | 68.32 | 175.38 | 2.69 | 4.87 | 33.03 | 272.97 @ 75F |
| 1988 | 50.0 | 50.0 | 50.0 | 327.51 | 207.65 | 131.18 | 77.14 | 81.99 | 515.70 | 305.67 | 185.90 | 113.77 | 126.88 | 4.08 | 7.45 | 33.03 | 542.39 @100F |
| 1988 | 20.6 | 27.3 | 20.6 | 174.25 | 115.73 | 77.82 | 51.45 | 95.20 | 258.00 | 170.39 | 117.39 | 83.54 | 168.51 | 2.84 | 5.05 | 33.03 | |
| 1990 | 0.0 | 0.0 | 0.0 | 106.11 | 71.51 | 49.03 | 34.31 | 74.98 | 132.02 | 99.45 | 76.37 | 59.72 | 154.95 | 2.08 | 3.66 | 31.68 | |
| 1990 | 0.0 | 100.0 | 0.0 | 82.77 | 65.03 | 51.84 | 42.05 | 67.74 | 84.07 | 73.55 | 65.71 | 59.90 | 117.54 | 3.25 | 6.42 | 31.68 | 282.96 @ 0F |
| 1990 | 100.0 | 0.0 | 100.0 | 516.47 | 320.06 | 192.90 | 99.16 | 68.46 | 872.72 | 490.35 | 273.60 | 140.62 | 89.14 | 4.35 | 7.85 | 31.68 | 251.93 @ 25F |
| 1990 | 50.0 | 0.0 | 50.0 | 266.72 | 168.55 | 104.97 | 59.17 | 70.14 | 427.16 | 254.48 | 153.91 | 90.81 | 124.09 | 2.91 | 5.20 | 31.68 | 225.04 @ 50F |
| 1990 | 0.0 | 50.0 | 0.0 | 93.61 | 66.77 | 48.68 | 36.37 | 69.89 | 108.89 | 86.16 | 69.92 | 58.16 | 135.83 | 2.50 | 4.67 | 31.68 | 201.71 @ 75F |
| 1990 | 50.0 | 50.0 | 50.0 | 299.62 | 192.54 | 122.37 | 70.60 | 68.10 | 478.39 | 281.95 | 169.66 | 100.26 | 103.34 | 3.80 | 7.14 | 31.68 | 321.43 @100F |
| 1990 | 20.6 | 27.3 | 20.6 | 164.97 | 108.59 | 71.69 | 45.57 | 70.18 | 240.18 | 155.63 | 104.55 | 71.56 | 131.83 | 2.65 | 4.83 | 31.68 | |
| 1995 | 0.0 | 0.0 | 0.0 | 105.64 | 66.81 | 42.38 | 26.98 | 43.47 | 122.41 | 82.91 | 57.00 | 39.83 | 91.57 | 1.94 | 3.54 | 29.95 | |
| 1995 | 0.0 | 100.0 | 0.0 | 86.49 | 64.75 | 48.60 | 36.61 | 49.36 | 88.45 | 70.07 | 56.33 | 46.03 | 77.42 | 3.04 | 6.24 | 29.95 | 178.86 @ 0F |
| 1995 | 100.0 | 0.0 | 100.0 | 423.32 | 272.72 | 169.30 | 85.98 | 61.94 | 732.94 | 407.37 | 225.14 | 108.15 | 73.39 | 4.10 | 7.63 | 29.95 | 156.44 @ 25F |
| 1995 | 50.0 | 0.0 | 50.0 | 228.67 | 146.60 | 91.53 | 49.61 | 49.49 | 362.19 | 209.82 | 122.35 | 65.90 | 81.55 | 2.73 | 5.05 | 29.95 | 137.10 @ 50F |
| 1995 | 0.0 | 50.0 | 0.0 | 94.83 | 63.97 | 43.57 | 29.99 | 44.49 | 105.17 | 75.28 | 55.01 | 41.11 | 83.24 | 2.34 | 4.53 | 29.95 | 120.39 @ 75F |
| 1995 | 50.0 | 50.0 | 50.0 | 254.90 | 168.74 | 108.95 | 61.29 | 55.65 | 410.69 | 238.72 | 140.74 | 77.09 | 75.40 | 3.57 | 6.93 | 29.95 | 168.83 @100F |
| 1995 | 20.6 | 27.3 | 20.6 | 150.03 | 97.86 | 63.10 | 37.85 | 46.45 | 211.07 | 130.63 | 82.62 | 51.16 | 82.88 | 2.48 | 4.68 | 29.95 | |
| 2000 | 0.0 | 0.0 | 0.0 | 102.61 | 64.11 | 40.06 | 25.03 | 35.39 | 117.94 | 74.74 | 47.53 | 30.35 | 51.40 | 1.92 | 3.53 | 29.05 | |
| 2000 | 0.0 | 100.0 | 0.0 | 84.47 | 62.66 | 46.47 | 34.47 | 43.92 | 91.23 | 68.47 | 51.55 | 38.96 | 54.11 | 3.02 | 6.25 | 29.05 | 143.65 @ 0F |
| 2000 | 100.0 | 0.0 | 100.0 | 393.16 | 257.29 | 161.02 | 80.84 | 59.00 | 648.52 | 358.04 | 197.25 | 90.63 | 64.81 | 4.10 | 7.63 | 29.05 | 124.52 @ 25F |
| 2000 | 50.0 | 0.0 | 50.0 | 214.95 | 138.93 | 86.91 | 46.45 | 43.70 | 325.20 | 185.05 | 105.58 | 53.39 | 55.17 | 2.72 | 5.04 | 29.05 | 108.06 @ 50F |
| 2000 | 0.0 | 50.0 | 0.0 | 92.30 | 61.59 | 41.39 | 28.02 | 37.71 | 103.75 | 69.99 | 47.68 | 32.85 | 50.92 | 2.32 | 4.52 | 29.05 | 93.89 @ 75F |
| 2000 | 50.0 | 50.0 | 50.0 | 238.81 | 159.97 | 103.74 | 57.65 | 51.46 | 369.88 | 213.25 | 124.40 | 64.80 | 59.46 | 3.56 | 6.94 | 29.05 | 119.01 @100F |
| 2000 | 20.6 | 27.3 | 20.6 | 142.90 | 93.30 | 59.92 | 35.39 | 40.02 | 194.95 | 117.23 | 71.33 | 41.10 | 52.64 | 2.46 | 4.68 | 29.05 | |

TABLE 26 : CO AT 10.0 MPH.

# TABLE 27

## HIGH ALTITUDE

## CO EMISSION FACTORS (GRAMS/MILE) AT 19.6 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | LDGV | | | | | LDGT | | | | | -LDDV- | -LDDT- | -HDDV- | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0°F | 25°F | 50°F | 75°F | 100°F | 0°F | 25°F | 50°F | 75°F | 100°F | 0-100F | 0-100F | 0-100F | |
| 1980 | 0.0 | 0.0 | 0.0 | 88.45 | 77.68 | 69.04 | 62.09 | 137.18 | 121.53 | 108.28 | 97.35 | 88.34 | 169.65 | 1.67 | 2.77 | 23.53 | 377.13 @ 0F |
| 1980 | 0.0 | 100.0 | 0.0 | 52.94 | 54.02 | 55.46 | 57.26 | 111.35 | 73.48 | 75.54 | 77.81 | 80.34 | 150.81 | 2.83 | 4.81 | 23.53 | 343.95 @ 25F |
| 1980 | 100.0 | 0.0 | 100.0 | 641.34 | 370.41 | 215.38 | 125.85 | 78.28 | 822.81 | 481.08 | 283.39 | 168.31 | 100.13 | 3.50 | 5.90 | 23.53 | 313.97 @ 50F |
| 1980 | 50.0 | 0.0 | 50.0 | 316.35 | 198.08 | 128.80 | 87.57 | 110.10 | 415.91 | 264.51 | 174.84 | 121.00 | 137.62 | 2.35 | 3.92 | 23.53 | 286.86 @ 75F |
| 1980 | 0.0 | 50.0 | 0.0 | 71.88 | 66.27 | 62.02 | 58.90 | 124.00 | 99.20 | 92.67 | 87.56 | 83.63 | 159.41 | 2.10 | 3.52 | 23.53 | 490.18 @100F |
| 1980 | 50.0 | 50.0 | 50.0 | 347.14 | 212.21 | 135.42 | 91.56 | 94.82 | 448.15 | 278.31 | 180.60 | 124.32 | 125.47 | 3.16 | 5.35 | 23.53 | |
| 1980 | 20.6 | 27.3 | 20.6 | 172.76 | 120.77 | 89.68 | 70.77 | 118.87 | 229.99 | 163.79 | 123.75 | 99.14 | 150.90 | 2.18 | 3.64 | 23.53 | |
| 1985 | 0.0 | 0.0 | 0.0 | 70.30 | 54.36 | 43.13 | 35.09 | 87.00 | 103.31 | 86.14 | 72.63 | 61.90 | 150.17 | 1.50 | 2.48 | 20.03 | 301.71 @ 0F |
| 1935 | 0.0 | 100.0 | 0.0 | 48.52 | 42.88 | 38.86 | 36.12 | 68.97 | 58.49 | 57.40 | 56.80 | 56.60 | 114.44 | 2.36 | 4.33 | 20.03 | 274.99 @ 25F |
| 1985 | 100.0 | 0.0 | 100.0 | 444.31 | 265.34 | 156.12 | 84.50 | 54.94 | 702.04 | 396.67 | 224.61 | 125.77 | 75.71 | 3.09 | 5.31 | 20.03 | 251.64 @ 50F |
| 1985 | 50.0 | 0.0 | 50.0 | 220.31 | 138.61 | 87.89 | 54.28 | 71.73 | 346.97 | 212.04 | 133.68 | 86.92 | 116.18 | 2.09 | 3.52 | 20.03 | 231.15 @ 75F |
| 1985 | 0.0 | 50.0 | 0.0 | 59.53 | 48.21 | 40.24 | 34.60 | 77.54 | 82.41 | 72.29 | 64.44 | 58.34 | 132.37 | 1.81 | 3.16 | 20.03 | 408.34 @100F |
| 1985 | 50.0 | 50.0 | 50.0 | 246.41 | 154.11 | 97.49 | 60.31 | 61.96 | 380.26 | 227.04 | 140.71 | 91.18 | 95.07 | 2.72 | 4.82 | 20.03 | |
| 1985 | 20.6 | 27.3 | 20.6 | 125.82 | 85.47 | 59.85 | 42.66 | 75.56 | 191.69 | 130.13 | 93.15 | 70.18 | 126.51 | 1.91 | 3.27 | 20.03 | |
| 1988 | 0.0 | 0.0 | 0.0 | 67.42 | 47.70 | 34.58 | 25.73 | 68.95 | 90.06 | 71.02 | 56.94 | 46.35 | 129.38 | 1.24 | 2.13 | 18.38 | 198.16 @ 0F |
| 1988 | 0.0 | 100.0 | 0.0 | 50.45 | 41.19 | 34.36 | 29.35 | 56.39 | 54.01 | 49.67 | 46.50 | 44.23 | 97.27 | 1.95 | 3.73 | 18.38 | 178.16 @ 25F |
| 1988 | 100.0 | 0.0 | 100.0 | 366.75 | 223.35 | 132.83 | 69.12 | 48.62 | 607.99 | 343.14 | 192.73 | 102.55 | 66.85 | 2.59 | 4.56 | 18.38 | 160.78 @ 50F |
| 1988 | 50.0 | 0.0 | 50.0 | 185.67 | 116.84 | 73.01 | 42.42 | 58.83 | 298.27 | 179.92 | 110.78 | 68.11 | 100.66 | 1.74 | 3.02 | 18.38 | 145.64 @ 75F |
| 1988 | 0.0 | 50.0 | 0.0 | 58.63 | 43.68 | 33.48 | 26.44 | 62.05 | 72.97 | 60.44 | 51.20 | 44.31 | 113.33 | 1.50 | 2.71 | 18.38 | 289.39 @100F |
| 1988 | 50.0 | 50.0 | 50.0 | 208.60 | 132.27 | 83.60 | 49.24 | 52.51 | 331.00 | 196.41 | 119.62 | 73.39 | 82.06 | 2.27 | 4.15 | 18.38 | |
| 1988 | 20.6 | 27.3 | 20.6 | 110.99 | 73.78 | 49.68 | 32.93 | 61.01 | 165.96 | 109.81 | 75.83 | 54.12 | 108.83 | 1.58 | 2.81 | 18.38 | |
| 1990 | 0.0 | 0.0 | 0.0 | 67.30 | 45.40 | 31.17 | 21.85 | 47.71 | 84.68 | 63.94 | 49.21 | 38.58 | 99.46 | 1.16 | 2.03 | 17.63 | 150.97 @ 0F |
| 1990 | 0.0 | 100.0 | 0.0 | 52.45 | 41.23 | 32.89 | 26.71 | 43.06 | 53.66 | 47.04 | 42.11 | 38.47 | 75.51 | 1.81 | 3.57 | 17.63 | 134.41 @ 25F |
| 1990 | 100.0 | 0.0 | 100.0 | 327.77 | 203.11 | 122.42 | 62.96 | 43.47 | 557.63 | 313.51 | 175.06 | 90.14 | 57.10 | 2.42 | 4.37 | 17.63 | 120.07 @ 50F |
| 1990 | 50.0 | 0.0 | 50.0 | 169.28 | 106.99 | 66.66 | 37.61 | 44.59 | 273.30 | 163.00 | 98.73 | 58.41 | 79.60 | 1.62 | 2.90 | 17.63 | 107.62 @ 75F |
| 1990 | 0.0 | 50.0 | 0.0 | 59.36 | 42.37 | 30.92 | 23.14 | 44.46 | 69.73 | 55.29 | 44.96 | 37.48 | 87.22 | 1.39 | 2.60 | 17.63 | 171.50 @100F |
| 1990 | 50.0 | 50.0 | 50.0 | 190.11 | 122.17 | 77.66 | 44.84 | 43.27 | 305.65 | 180.27 | 108.59 | 64.31 | 66.30 | 2.12 | 3.97 | 17.63 | |
| 1990 | 20.6 | 27.3 | 20.6 | 104.67 | 68.92 | 45.53 | 28.98 | 44.63 | 153.71 | 99.75 | 67.14 | 46.07 | 84.62 | 1.47 | 2.69 | 17.63 | |
| 1995 | 0.0 | 0.0 | 0.0 | 66.84 | 42.27 | 26.81 | 17.07 | 27.50 | 77.74 | 52.70 | 36.28 | 25.38 | 58.26 | 1.08 | 1.97 | 16.67 | 95.43 @ 0F |
| 1995 | 0.0 | 100.0 | 0.0 | 54.72 | 40.97 | 30.75 | 23.16 | 31.23 | 56.07 | 44.45 | 35.76 | 29.25 | 49.24 | 1.69 | 3.47 | 16.67 | 83.47 @ 25F |
| 1995 | 100.0 | 0.0 | 100.0 | 267.84 | 172.56 | 107.12 | 54.40 | 39.19 | 464.92 | 258.45 | 142.87 | 68.67 | 46.58 | 2.28 | 4.24 | 16.67 | 73.15 @ 50F |
| 1995 | 50.0 | 0.0 | 50.0 | 144.69 | 92.76 | 57.91 | 31.39 | 31.32 | 229.84 | 133.20 | 77.71 | 41.91 | 51.84 | 1.52 | 2.81 | 16.67 | 64.23 @ 75F |
| 1995 | 0.0 | 50.0 | 0.0 | 60.00 | 40.47 | 27.57 | 18.98 | 28.15 | 66.75 | 47.82 | 34.98 | 26.17 | 52.96 | 1.30 | 2.52 | 16.67 | 90.08 @100F |
| 1995 | 50.0 | 50.0 | 50.0 | 161.28 | 106.76 | 68.94 | 38.78 | 35.21 | 260.50 | 151.45 | 89.31 | 48.96 | 47.91 | 1.99 | 3.86 | 16.67 | |
| 1995 | 20.6 | 27.3 | 20.6 | 94.93 | 61.92 | 39.92 | 23.95 | 29.39 | 133.95 | 82.95 | 52.50 | 32.55 | 52.71 | 1.38 | 2.61 | 16.67 | |
| 2000 | 0.0 | 0.0 | 0.0 | 64.92 | 40.56 | 25.34 | 15.84 | 22.39 | 74.62 | 47.29 | 30.07 | 19.20 | 32.52 | 1.07 | 1.97 | 16.17 | 76.64 @ 0F |
| 2000 | 0.0 | 100.0 | 0.0 | 53.45 | 39.64 | 29.40 | 21.81 | 27.79 | 57.72 | 43.32 | 32.61 | 24.65 | 34.24 | 1.68 | 3.48 | 16.17 | 66.44 @ 25F |
| 2000 | 100.0 | 0.0 | 100.0 | 248.76 | 162.79 | 101.88 | 51.15 | 37.33 | 410.34 | 226.54 | 124.81 | 57.35 | 41.01 | 2.28 | 4.24 | 16.17 | 57.66 @ 50F |
| 2000 | 50.0 | 0.0 | 50.0 | 136.01 | 87.90 | 54.99 | 29.39 | 27.65 | 205.76 | 117.08 | 66.80 | 33.78 | 34.91 | 1.52 | 2.81 | 16.17 | 50.09 @ 75F |
| 2000 | 0.0 | 50.0 | 0.0 | 58.40 | 38.97 | 26.19 | 17.73 | 23.86 | 65.65 | 44.28 | 30.17 | 20.79 | 32.22 | 1.29 | 2.52 | 16.17 | 63.50 @100F |
| 2000 | 50.0 | 50.0 | 50.0 | 151.10 | 101.22 | 65.64 | 36.48 | 32.56 | 234.03 | 134.93 | 78.71 | 41.00 | 37.62 | 1.98 | 3.86 | 16.17 | |
| 2000 | 20.6 | 27.3 | 20.6 | 90.41 | 59.03 | 37.91 | 22.39 | 25.32 | 123.35 | 74.18 | 45.13 | 26.01 | 33.31 | 1.37 | 2.61 | 16.17 | |

TABLE 27 : CO AT 19.6 MPH.

# TABLE 28

# HIGH ALTITUDE

## CO EMISSION FACTORS (GRAMS/MILE) AT 35.0 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | LDGV | | | | | LDGT | | | | | -LDDV- | -LDDT- | -HDDV- | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0°F | 25°F | 50°F | 75°F | 100°F | 0°F | 25°F | 50°F | 75°F | 100°F | 0-100F | 0-100F | 0-100F | |
| 1980 | 0.0 | 0.0 | 0.0 | 56.69 | 50.46 | 45.45 | 41.41 | 87.07 | 82.27 | 73.90 | 66.98 | 61.25 | 112.68 | 0.93 | 1.54 | 13.04 | 210.25 @ 0F |
| 1980 | 0.0 | 100.0 | 0.0 | 34.15 | 35.12 | 36.33 | 37.79 | 72.45 | 50.02 | 51.63 | 53.40 | 55.35 | 102.79 | 1.57 | 2.67 | 13.04 | 191.75 @ 25F |
| 1980 | 100.0 | 0.0 | 100.0 | 405.50 | 236.30 | 138.66 | 81.80 | 50.92 | 544.93 | 321.28 | 190.83 | 114.26 | 67.79 | 1.94 | 3.27 | 13.04 | 175.04 @ 50F |
| 1980 | 50.0 | 0.0 | 50.0 | 201.54 | 127.48 | 83.82 | 57.68 | 70.42 | 277.86 | 178.31 | 118.94 | 83.07 | 91.96 | 1.30 | 2.18 | 13.04 | 159.93 @ 75F |
| 1980 | 0.0 | 50.0 | 0.0 | 46.18 | 43.09 | 40.79 | 39.16 | 79.53 | 67.29 | 63.32 | 60.23 | 57.89 | 107.09 | 1.16 | 1.95 | 13.04 | 273.28 @100F |
| 1980 | 50.0 | 50.0 | 50.0 | 219.83 | 135.71 | 87.50 | 59.80 | 61.69 | 297.48 | 186.46 | 122.12 | 84.81 | 85.29 | 1.75 | 2.97 | 13.04 | |
| 1980 | 20.6 | 27.3 | 20.6 | 110.30 | 77.99 | 58.62 | 46.84 | 76.12 | 154.27 | 110.92 | 84.59 | 68.35 | 101.12 | 1.21 | 2.02 | 13.04 | |
| 1985 | 0.0 | 0.0 | 0.0 | 41.63 | 32.66 | 26.33 | 21.79 | 52.30 | 64.73 | 54.55 | 46.49 | 40.06 | 92.61 | 0.83 | 1.37 | 11.10 | 168.20 @ 0F |
| 1985 | 0.0 | 100.0 | 0.0 | 28.33 | 25.33 | 23.25 | 21.89 | 41.73 | 36.37 | 35.98 | 35.88 | 36.02 | 72.12 | 1.31 | 2.40 | 11.10 | 153.31 @ 25F |
| 1985 | 100.0 | 0.0 | 100.0 | 262.97 | 157.33 | 92.84 | 50.70 | 32.96 | 430.68 | 244.99 | 139.74 | 78.98 | 47.30 | 1.71 | 2.94 | 11.10 | 140.29 @ 50F |
| 1985 | 50.0 | 0.0 | 50.0 | 130.89 | 82.71 | 52.81 | 33.07 | 43.11 | 214.70 | 132.32 | 84.23 | 55.42 | 71.91 | 1.16 | 1.95 | 11.10 | 128.87 @ 75F |
| 1985 | 0.0 | 50.0 | 0.0 | 35.09 | 28.80 | 24.39 | 21.29 | 46.76 | 51.53 | 45.65 | 41.09 | 37.55 | 82.36 | 1.00 | 1.75 | 11.10 | 227.65 @100F |
| 1985 | 50.0 | 50.0 | 50.0 | 145.65 | 91.33 | 58.04 | 36.30 | 37.35 | 233.52 | 140.49 | 87.81 | 57.50 | 59.71 | 1.51 | 2.67 | 11.10 | |
| 1985 | 20.6 | 27.3 | 20.6 | 74.60 | 51.04 | 36.10 | 26.12 | 45.50 | 118.95 | 81.54 | 58.99 | 44.97 | 78.52 | 1.06 | 1.81 | 11.10 | |
| 1988 | 0.0 | 0.0 | 0.0 | 38.50 | 27.49 | 20.15 | 15.20 | 40.58 | 54.48 | 43.46 | 35.25 | 29.03 | 78.50 | 0.69 | 1.18 | 10.19 | 110.47 @ 0F |
| 1988 | 0.0 | 100.0 | 0.0 | 28.55 | 23.46 | 19.72 | 17.00 | 33.22 | 32.12 | 29.83 | 28.20 | 27.08 | 59.97 | 1.08 | 2.07 | 10.19 | 99.32 @ 25F |
| 1988 | 100.0 | 0.0 | 100.0 | 210.15 | 128.00 | 76.18 | 39.85 | 28.35 | 361.50 | 204.85 | 115.60 | 62.08 | 40.68 | 1.44 | 2.53 | 10.19 | 89.64 @ 50F |
| 1988 | 50.0 | 0.0 | 50.0 | 106.53 | 67.17 | 42.13 | 24.70 | 34.52 | 178.60 | 108.41 | 67.29 | 41.90 | 61.13 | 0.96 | 1.68 | 10.19 | 81.20 @ 75F |
| 1988 | 0.0 | 50.0 | 0.0 | 33.37 | 25.06 | 19.39 | 15.49 | 36.55 | 43.92 | 36.76 | 31.47 | 27.53 | 69.22 | 0.83 | 1.50 | 10.19 | 161.34 @100F |
| 1988 | 50.0 | 50.0 | 50.0 | 119.35 | 75.73 | 47.95 | 28.42 | 30.78 | 196.81 | 117.34 | 71.90 | 44.58 | 50.33 | 1.26 | 2.30 | 10.19 | |
| 1988 | 20.6 | 27.3 | 20.6 | 63.53 | 42.39 | 28.72 | 19.23 | 35.89 | 99.53 | 66.39 | 46.30 | 33.46 | 66.31 | 0.88 | 1.56 | 10.19 | |
| 1990 | 0.0 | 0.0 | 0.0 | 37.86 | 25.65 | 17.72 | 12.52 | 27.21 | 50.05 | 38.19 | 29.72 | 23.56 | 58.99 | 0.64 | 1.13 | 9.77 | 84.17 @ 0F |
| 1990 | 0.0 | 100.0 | 0.0 | 29.38 | 23.15 | 18.54 | 15.13 | 24.47 | 31.14 | 27.53 | 24.88 | 22.94 | 45.07 | 1.00 | 1.98 | 9.77 | 74.94 @ 25F |
| 1990 | 100.0 | 0.0 | 100.0 | 184.77 | 114.48 | 69.02 | 35.59 | 24.57 | 325.04 | 183.26 | 102.67 | 53.30 | 33.58 | 1.34 | 2.42 | 9.77 | 66.94 @ 50F |
| 1990 | 50.0 | 0.0 | 50.0 | 95.46 | 60.39 | 37.69 | 21.37 | 25.35 | 160.18 | 96.02 | 58.54 | 35.04 | 47.09 | 0.90 | 1.61 | 9.77 | 60.00 @ 75F |
| 1990 | 0.0 | 50.0 | 0.0 | 33.34 | 23.88 | 17.52 | 13.19 | 25.33 | 40.98 | 32.80 | 26.94 | 22.69 | 51.88 | 0.77 | 1.44 | 9.77 | 95.61 @100F |
| 1990 | 50.0 | 50.0 | 50.0 | 107.07 | 68.82 | 43.78 | 25.36 | 24.52 | 178.09 | 105.40 | 63.78 | 38.12 | 39.32 | 1.17 | 2.20 | 9.77 | |
| 1990 | 20.6 | 27.3 | 20.6 | 58.95 | 38.89 | 25.77 | 16.49 | 25.41 | 90.18 | 58.91 | 39.99 | 27.77 | 50.22 | 0.82 | 1.49 | 9.77 | |
| 1995 | 0.0 | 0.0 | 0.0 | 37.22 | 23.53 | 14.93 | 9.51 | 15.31 | 43.96 | 29.93 | 20.70 | 14.56 | 33.22 | 0.60 | 1.09 | 9.24 | 53.20 @ 0F |
| 1995 | 0.0 | 100.0 | 0.0 | 30.47 | 22.81 | 17.12 | 12.90 | 17.39 | 31.47 | 25.02 | 20.19 | 16.58 | 28.01 | 0.94 | 1.93 | 9.24 | 46.53 @ 25F |
| 1995 | 100.0 | 0.0 | 100.0 | 149.13 | 96.07 | 59.64 | 30.29 | 21.82 | 261.64 | 145.55 | 80.53 | 38.82 | 26.28 | 1.26 | 2.35 | 9.24 | 40.78 @ 50F |
| 1995 | 50.0 | 0.0 | 50.0 | 80.56 | 51.65 | 32.24 | 17.48 | 17.44 | 129.57 | 75.21 | 43.98 | 23.83 | 29.44 | 0.84 | 1.56 | 9.24 | 35.81 @ 75F |
| 1995 | 0.0 | 50.0 | 0.0 | 33.41 | 22.53 | 15.35 | 10.56 | 15.67 | 37.65 | 27.06 | 19.87 | 14.94 | 30.18 | 0.72 | 1.40 | 9.24 | 50.22 @100F |
| 1995 | 50.0 | 50.0 | 50.0 | 89.80 | 59.44 | 38.38 | 21.59 | 19.60 | 146.56 | 85.28 | 50.36 | 27.70 | 27.14 | 1.10 | 2.14 | 9.24 | |
| 1995 | 20.6 | 27.3 | 20.6 | 52.85 | 34.47 | 22.23 | 13.33 | 16.36 | 75.53 | 46.88 | 29.76 | 18.54 | 30.00 | 0.76 | 1.44 | 9.24 | |
| 2000 | 0.0 | 0.0 | 0.0 | 36.15 | 22.58 | 14.11 | 8.82 | 12.47 | 41.55 | 26.33 | 16.74 | 10.69 | 18.11 | 0.59 | 1.09 | 8.96 | 42.73 @ 0F |
| 2000 | 0.0 | 100.0 | 0.0 | 29.76 | 22.07 | 16.37 | 12.14 | 15.47 | 32.14 | 24.12 | 18.16 | 13.72 | 19.06 | 0.93 | 1.93 | 8.96 | 37.04 @ 25F |
| 2000 | 100.0 | 0.0 | 100.0 | 138.50 | 90.64 | 56.72 | 28.48 | 20.78 | 228.46 | 126.13 | 69.49 | 31.93 | 22.83 | 1.26 | 2.35 | 8.96 | 32.14 @ 50F |
| 2000 | 50.0 | 0.0 | 50.0 | 75.72 | 48.94 | 30.62 | 16.36 | 15.40 | 114.56 | 65.19 | 37.19 | 18.81 | 19.44 | 0.84 | 1.56 | 8.96 | 27.93 @ 75F |
| 2000 | 0.0 | 50.0 | 0.0 | 32.51 | 21.70 | 14.58 | 9.87 | 13.28 | 36.55 | 24.65 | 16.80 | 11.57 | 17.94 | 0.72 | 1.40 | 8.96 | 35.40 @100F |
| 2000 | 50.0 | 50.0 | 50.0 | 84.13 | 56.35 | 36.55 | 20.31 | 18.13 | 130.30 | 75.12 | 43.82 | 22.83 | 20.95 | 1.10 | 2.14 | 8.96 | |
| 2000 | 20.6 | 27.3 | 20.6 | 50.34 | 32.87 | 21.11 | 12.47 | 14.10 | 68.68 | 41.30 | 25.13 | 14.48 | 18.54 | 0.76 | 1.44 | 8.96 | |

TABLE 28 : CO AT 35.0 MPH.

# TABLE 29

## HIGH ALTITUDE

### CO EMISSION FACTORS (GRAMS/MILE) AT 50.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | LDGV 0°F | LDGV 25°F | LDGV 50°F | LDGV 75°F | LDGV 100°F | LDGT 0°F | LDGT 25°F | LDGT 50°F | LDGT 75°F | LDGT 100°F | -LDDV- 0-100F | -LDDT- 0-100F | -HDDV- 0-100F | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 50.37 | 44.98 | 40.64 | 37.14 | 77.19 | 73.99 | 66.56 | 60.41 | 55.32 | 100.93 | 0.79 | 1.31 | 11.12 | |
| 1980 | 0.0 | 100.0 | 0.0 | 30.40 | 31.31 | 32.45 | 33.81 | 64.63 | 44.99 | 46.48 | 48.12 | 49.91 | 92.55 | 1.34 | 2.27 | 11.12 | 196.53 @ 0F |
| 1980 | 100.0 | 0.0 | 100.0 | 359.53 | 209.91 | 123.41 | 72.95 | 45.36 | 487.81 | 288.07 | 171.37 | 102.75 | 60.91 | 1.65 | 2.79 | 11.12 | 179.24 @ 25F |
| 1980 | 50.0 | 0.0 | 50.0 | 179.00 | 113.47 | 74.78 | 51.59 | 62.52 | 249.22 | 160.20 | 107.04 | 74.88 | 82.45 | 1.11 | 1.85 | 11.12 | 163.61 @ 50F |
| 1980 | 0.0 | 50.0 | 0.0 | 41.06 | 38.41 | 36.47 | 35.10 | 70.70 | 60.52 | 57.02 | 54.31 | 52.26 | 96.14 | 0.99 | 1.66 | 11.12 | 149.49 @ 75F |
| 1980 | 50.0 | 50.0 | 50.0 | 194.96 | 120.61 | 77.93 | 53.38 | 55.00 | 266.40 | 167.27 | 109.74 | 76.33 | 76.73 | 1.50 | 2.53 | 11.12 | 255.44 @100F |
| 1980 | 20.6 | 27.3 | 20.6 | 97.99 | 69.46 | 52.35 | 41.94 | 67.62 | 138.47 | 99.74 | 76.19 | 61.66 | 90.72 | 1.03 | 1.72 | 11.12 | |
| 1985 | 0.0 | 0.0 | 0.0 | 36.30 | 28.59 | 23.14 | 19.23 | 45.78 | 57.27 | 48.38 | 41.33 | 35.70 | 81.63 | 0.71 | 1.17 | 9.46 | |
| 1985 | 0.0 | 100.0 | 0.0 | 24.63 | 22.08 | 20.33 | 19.21 | 36.60 | 32.11 | 31.82 | 31.79 | 31.97 | 63.88 | 1.11 | 2.05 | 9.46 | 157.23 @ 0F |
| 1985 | 100.0 | 0.0 | 100.0 | 229.38 | 137.29 | 81.07 | 44.37 | 28.84 | 379.05 | 215.96 | 123.38 | 69.88 | 41.80 | 1.46 | 2.51 | 9.46 | 143.30 @ 25F |
| 1985 | 50.0 | 0.0 | 50.0 | 114.28 | 72.29 | 46.24 | 29.05 | 37.73 | 189.37 | 116.94 | 74.60 | 49.22 | 63.43 | 0.99 | 1.66 | 9.46 | 131.13 @ 50F |
| 1985 | 0.0 | 50.0 | 0.0 | 30.57 | 25.18 | 21.40 | 18.75 | 40.97 | 45.56 | 40.45 | 36.49 | 33.42 | 72.74 | 0.86 | 1.49 | 9.46 | 120.46 @ 75F |
| 1985 | 50.0 | 50.0 | 50.0 | 127.00 | 79.68 | 50.70 | 31.79 | 32.72 | 205.58 | 123.89 | 77.58 | 50.93 | 52.84 | 1.29 | 2.28 | 9.46 | 212.79 @100F |
| 1985 | 20.6 | 27.3 | 20.6 | 65.09 | 44.61 | 31.64 | 22.97 | 39.85 | 104.99 | 72.13 | 52.31 | 39.98 | 69.31 | 0.90 | 1.54 | 9.46 | |
| 1988 | 0.0 | 0.0 | 0.0 | 33.28 | 23.83 | 17.52 | 13.26 | 35.36 | 47.83 | 38.26 | 31.11 | 25.70 | 68.95 | 0.59 | 1.00 | 8.68 | |
| 1988 | 0.0 | 100.0 | 0.0 | 24.63 | 20.27 | 17.07 | 14.76 | 28.96 | 28.07 | 26.13 | 24.76 | 23.84 | 52.87 | 0.92 | 1.76 | 8.68 | 103.26 @ 0F |
| 1988 | 100.0 | 0.0 | 100.0 | 181.90 | 110.79 | 65.96 | 34.55 | 24.64 | 315.88 | 179.18 | 101.23 | 54.49 | 35.74 | 1.22 | 2.16 | 8.68 | 92.84 @ 25F |
| 1988 | 50.0 | 0.0 | 50.0 | 92.24 | 58.19 | 36.53 | 21.47 | 30.05 | 156.35 | 95.06 | 59.11 | 36.92 | 53.69 | 0.82 | 1.43 | 8.68 | 83.78 @ 50F |
| 1988 | 0.0 | 50.0 | 0.0 | 28.83 | 21.70 | 16.83 | 13.49 | 31.86 | 38.50 | 32.31 | 27.73 | 24.32 | 60.89 | 0.71 | 1.28 | 8.68 | 75.90 @ 75F |
| 1988 | 50.0 | 50.0 | 50.0 | 103.27 | 65.53 | 41.52 | 24.65 | 26.80 | 171.98 | 102.66 | 63.00 | 39.16 | 44.31 | 1.07 | 1.96 | 8.68 | 150.80 @100F |
| 1988 | 20.6 | 27.3 | 20.6 | 54.98 | 36.72 | 24.92 | 16.74 | 31.26 | 87.17 | 58.26 | 40.73 | 29.53 | 58.29 | 0.75 | 1.33 | 8.68 | |
| 1990 | 0.0 | 0.0 | 0.0 | 32.59 | 22.11 | 15.29 | 10.83 | 23.51 | 43.66 | 33.40 | 26.06 | 20.72 | 51.51 | 0.55 | 0.96 | 8.33 | |
| 1990 | 0.0 | 100.0 | 0.0 | 25.26 | 19.92 | 15.97 | 13.05 | 21.12 | 27.04 | 23.96 | 21.69 | 20.06 | 39.40 | 0.86 | 1.69 | 8.33 | 78.67 @ 0F |
| 1990 | 100.0 | 0.0 | 100.0 | 159.12 | 98.60 | 59.45 | 30.67 | 21.18 | 282.46 | 159.36 | 89.36 | 46.48 | 29.25 | 1.14 | 2.06 | 8.33 | 70.04 @ 25F |
| 1990 | 50.0 | 0.0 | 50.0 | 82.22 | 52.03 | 32.49 | 18.44 | 21.88 | 139.40 | 83.67 | 51.10 | 30.67 | 41.10 | 0.77 | 1.37 | 8.33 | 62.57 @ 50F |
| 1990 | 0.0 | 50.0 | 0.0 | 28.69 | 20.57 | 15.10 | 11.39 | 21.87 | 35.70 | 28.64 | 23.58 | 19.91 | 45.33 | 0.66 | 1.23 | 8.33 | 56.08 @ 75F |
| 1990 | 50.0 | 50.0 | 50.0 | 92.19 | 59.26 | 37.71 | 21.86 | 21.15 | 154.75 | 91.66 | 55.53 | 33.27 | 34.33 | 1.00 | 1.88 | 8.33 | 89.37 @100F |
| 1990 | 20.6 | 27.3 | 20.6 | 50.76 | 33.50 | 22.21 | 14.24 | 21.94 | 78.50 | 51.37 | 34.95 | 24.34 | 43.86 | 0.70 | 1.27 | 8.33 | |
| 1995 | 0.0 | 0.0 | 0.0 | 31.96 | 20.21 | 12.82 | 8.16 | 13.15 | 37.92 | 25.84 | 17.90 | 12.61 | 28.72 | 0.51 | 0.93 | 7.87 | |
| 1995 | 0.0 | 100.0 | 0.0 | 26.16 | 19.59 | 14.70 | 11.07 | 14.93 | 27.09 | 21.55 | 17.41 | 14.31 | 24.20 | 0.80 | 1.64 | 7.87 | 49.73 @ 0F |
| 1995 | 100.0 | 0.0 | 100.0 | 128.05 | 82.49 | 51.21 | 26.01 | 18.74 | 225.37 | 125.40 | 69.39 | 33.48 | 22.65 | 1.08 | 2.00 | 7.87 | 43.50 @ 25F |
| 1995 | 50.0 | 0.0 | 50.0 | 69.17 | 44.35 | 27.69 | 15.01 | 14.97 | 111.67 | 64.85 | 37.94 | 20.58 | 25.43 | 0.72 | 1.33 | 7.87 | 38.12 @ 50F |
| 1995 | 0.0 | 50.0 | 0.0 | 28.68 | 19.35 | 13.18 | 9.07 | 13.46 | 32.45 | 23.35 | 17.17 | 12.92 | 26.09 | 0.61 | 1.19 | 7.87 | 33.47 @ 75F |
| 1995 | 50.0 | 50.0 | 50.0 | 77.10 | 51.04 | 32.96 | 18.54 | 16.83 | 126.23 | 73.47 | 43.40 | 23.90 | 23.43 | 0.94 | 1.82 | 7.87 | 46.94 @100F |
| 1995 | 20.6 | 27.3 | 20.6 | 45.38 | 29.60 | 19.09 | 11.45 | 14.05 | 65.10 | 40.43 | 25.69 | 16.03 | 25.92 | 0.65 | 1.23 | 7.87 | |
| 2000 | 0.0 | 0.0 | 0.0 | 31.04 | 19.39 | 12.12 | 7.57 | 10.71 | 35.67 | 22.61 | 14.38 | 9.18 | 15.55 | 0.50 | 0.93 | 7.64 | |
| 2000 | 0.0 | 100.0 | 0.0 | 25.55 | 18.95 | 14.06 | 10.43 | 13.29 | 27.60 | 20.71 | 15.59 | 11.78 | 16.37 | 0.79 | 1.64 | 7.64 | 39.94 @ 0F |
| 2000 | 100.0 | 0.0 | 100.0 | 118.92 | 77.83 | 48.70 | 24.45 | 17.85 | 196.17 | 108.30 | 59.67 | 27.42 | 19.60 | 1.08 | 2.01 | 7.64 | 34.62 @ 25F |
| 2000 | 50.0 | 0.0 | 50.0 | 65.02 | 42.02 | 26.29 | 14.05 | 13.22 | 98.37 | 55.97 | 31.94 | 16.15 | 16.69 | 0.72 | 1.33 | 7.64 | 30.05 @ 50F |
| 2000 | 0.0 | 50.0 | 0.0 | 27.92 | 18.63 | 12.52 | 8.48 | 11.41 | 31.38 | 21.17 | 14.42 | 9.94 | 15.40 | 0.61 | 1.19 | 7.64 | 26.10 @ 75F |
| 2000 | 50.0 | 50.0 | 50.0 | 72.24 | 48.39 | 31.38 | 17.44 | 15.57 | 111.88 | 64.51 | 37.63 | 19.60 | 17.99 | 0.94 | 1.82 | 7.64 | 33.09 @100F |
| 2000 | 20.6 | 27.3 | 20.6 | 43.22 | 28.22 | 18.12 | 10.71 | 12.10 | 58.97 | 35.46 | 21.57 | 12.43 | 15.92 | 0.65 | 1.23 | 7.64 | |

TABLE 29 : CO AT 50.0 MPH.

# TABLE 30

## HIGH ALTITUDE

## CO EMISSION FACTORS (GRAMS/MILE) AT 55.0 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | LDGV | | | | | LDGT | | | | | -LDDV- | -LDDT- | -HDDV- | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0°F | 25°F | 50°F | 75°F | 100°F | 0°F | 25°F | 50°F | 75°F | 100°F | 0-100F | 0-100F | 0-100F | |
| 1980 | 0.0 | 0.0 | 0.0 | 47.62 | 42.67 | 38.68 | 35.46 | 72.76 | 70.76 | 63.80 | 58.02 | 53.22 | 96.09 | 0.82 | 1.36 | 11.55 | 214.50 @ 0F |
| 1980 | 0.0 | 100.0 | 0.0 | 28.80 | 29.72 | 30.85 | 32.21 | 61.35 | 43.12 | 44.59 | 46.20 | 47.97 | 88.69 | 1.39 | 2.36 | 11.55 | 195.63 @ 25F |
| 1980 | 100.0 | 0.0 | 100.0 | 338.79 | 198.26 | 116.83 | 69.22 | 43.02 | 464.39 | 274.79 | 163.79 | 98.40 | 58.26 | 1.72 | 2.89 | 11.55 | 178.57 @ 50F |
| 1980 | 50.0 | 0.0 | 50.0 | 169.01 | 107.42 | 70.99 | 49.12 | 59.05 | 237.72 | 153.14 | 102.55 | 71.89 | 78.62 | 1.15 | 1.93 | 11.55 | 163.16 @ 75F |
| 1980 | 0.0 | 50.0 | 0.0 | 38.85 | 36.46 | 34.71 | 33.49 | 66.83 | 57.92 | 54.68 | 52.16 | 50.27 | 91.80 | 1.03 | 1.73 | 11.55 | 278.80 @100F |
| 1980 | 50.0 | 50.0 | 50.0 | 183.80 | 113.99 | 73.84 | 50.72 | 52.18 | 253.76 | 159.69 | 105.00 | 73.18 | 73.48 | 1.55 | 2.63 | 11.55 | |
| 1980 | 20.6 | 27.3 | 20.6 | 92.57 | 65.81 | 49.75 | 39.98 | 63.89 | 132.20 | 95.45 | 73.07 | 59.26 | 86.57 | 1.07 | 1.79 | 11.55 | |
| 1985 | 0.0 | 0.0 | 0.0 | 33.55 | 26.54 | 21.58 | 18.01 | 42.49 | 53.72 | 45.51 | 38.99 | 33.77 | 76.25 | 0.74 | 1.22 | 9.83 | 171.60 @ 0F |
| 1985 | 0.0 | 100.0 | 0.0 | 22.67 | 20.39 | 18.85 | 17.88 | 34.03 | 30.08 | 29.87 | 29.90 | 30.12 | 60.03 | 1.16 | 2.13 | 9.83 | 156.41 @ 25F |
| 1985 | 100.0 | 0.0 | 100.0 | 212.00 | 126.95 | 75.03 | 41.17 | 26.75 | 353.74 | 201.91 | 115.58 | 65.63 | 39.18 | 1.52 | 2.60 | 9.83 | 143.12 @ 50F |
| 1985 | 50.0 | 0.0 | 50.0 | 105.74 | 66.97 | 42.92 | 27.07 | 35.01 | 177.12 | 109.62 | 70.11 | 46.40 | 59.31 | 1.02 | 1.73 | 9.83 | 131.47 @ 75F |
| 1985 | 0.0 | 50.0 | 0.0 | 28.22 | 23.33 | 19.91 | 17.51 | 38.06 | 42.72 | 38.03 | 34.39 | 31.57 | 68.12 | 0.89 | 1.55 | 9.83 | 232.25 @100F |
| 1985 | 50.0 | 50.0 | 50.0 | 117.34 | 73.67 | 46.94 | 29.52 | 30.39 | 191.91 | 115.89 | 72.74 | 47.87 | 49.61 | 1.34 | 2.36 | 9.83 | |
| 1985 | 20.6 | 27.3 | 20.6 | 60.19 | 41.34 | 29.40 | 21.44 | 37.00 | 98.27 | 67.69 | 49.22 | 37.73 | 64.86 | 0.94 | 1.60 | 9.83 | |
| 1988 | 0.0 | 0.0 | 0.0 | 30.43 | 21.84 | 16.12 | 12.25 | 32.61 | 44.44 | 35.66 | 29.09 | 24.10 | 64.11 | 0.61 | 1.04 | 9.02 | 112.71 @ 0F |
| 1988 | 0.0 | 100.0 | 0.0 | 22.46 | 18.51 | 15.63 | 13.55 | 26.72 | 25.97 | 24.24 | 23.03 | 22.23 | 49.39 | 0.96 | 1.83 | 9.02 | 101.33 @ 25F |
| 1988 | 100.0 | 0.0 | 100.0 | 166.49 | 101.41 | 60.38 | 31.68 | 22.66 | 292.21 | 165.94 | 93.87 | 50.66 | 33.27 | 1.27 | 2.24 | 9.02 | 91.45 @ 50F |
| 1988 | 50.0 | 0.0 | 50.0 | 84.46 | 53.31 | 33.51 | 21.72 | 27.69 | 144.91 | 88.26 | 55.00 | 38.06 | 49.94 | 0.85 | 1.48 | 9.02 | 97.86 @ 75F |
| 1988 | 0.0 | 50.0 | 0.0 | 26.33 | 19.87 | 15.46 | 13.79 | 29.40 | 35.73 | 30.07 | 25.89 | 25.35 | 56.73 | 0.73 | 1.33 | 9.02 | 164.59 @100F |
| 1988 | 50.0 | 50.0 | 50.0 | 94.47 | 59.96 | 38.01 | 24.45 | 24.69 | 159.09 | 95.09 | 58.45 | 39.83 | 41.33 | 1.11 | 2.03 | 9.02 | |
| 1988 | 20.6 | 27.3 | 20.6 | 50.30 | 33.63 | 22.86 | 17.03 | 28.83 | 80.82 | 54.14 | 37.95 | 30.62 | 54.27 | 0.78 | 1.38 | 9.02 | |
| 1990 | 0.0 | 0.0 | 0.0 | 29.65 | 20.14 | 13.95 | 9.90 | 21.47 | 40.29 | 30.91 | 24.19 | 19.29 | 47.57 | 0.57 | 1.00 | 8.65 | 85.87 @ 0F |
| 1990 | 0.0 | 100.0 | 0.0 | 22.95 | 18.11 | 14.53 | 11.89 | 19.27 | 24.82 | 22.05 | 20.02 | 18.56 | 36.46 | 0.89 | 1.75 | 8.65 | 76.45 @ 25F |
| 1990 | 100.0 | 0.0 | 100.0 | 144.84 | 89.74 | 54.12 | 27.94 | 19.29 | 259.67 | 146.62 | 82.30 | 42.91 | 26.96 | 1.19 | 2.14 | 8.65 | 68.29 @ 50F |
| 1990 | 50.0 | 0.0 | 50.0 | 74.85 | 47.38 | 29.60 | 16.82 | 19.96 | 128.35 | 77.15 | 47.20 | 28.42 | 37.93 | 0.80 | 1.42 | 8.65 | 61.21 @ 75F |
| 1990 | 0.0 | 50.0 | 0.0 | 26.08 | 18.72 | 13.77 | 10.41 | 19.97 | 32.89 | 26.46 | 21.84 | 18.49 | 41.91 | 0.68 | 1.27 | 8.65 | 97.54 @100F |
| 1990 | 50.0 | 50.0 | 50.0 | 83.89 | 53.93 | 34.32 | 19.92 | 19.28 | 142.25 | 84.34 | 51.16 | 30.73 | 31.71 | 1.04 | 1.95 | 8.65 | |
| 1990 | 20.6 | 27.3 | 20.6 | 46.19 | 30.50 | 20.24 | 13.00 | 20.03 | 72.30 | 47.40 | 32.32 | 22.58 | 40.52 | 0.72 | 1.32 | 8.65 | |
| 1995 | 0.0 | 0.0 | 0.0 | 28.98 | 18.32 | 11.62 | 7.40 | 11.92 | 34.54 | 23.57 | 16.35 | 11.54 | 26.23 | 0.53 | 0.97 | 8.18 | 54.28 @ 0F |
| 1995 | 0.0 | 100.0 | 0.0 | 23.72 | 17.76 | 13.33 | 10.04 | 13.54 | 24.63 | 19.60 | 15.85 | 13.05 | 22.09 | 0.83 | 1.70 | 8.18 | 47.47 @ 25F |
| 1995 | 100.0 | 0.0 | 100.0 | 116.12 | 74.81 | 46.44 | 23.58 | 16.99 | 205.03 | 114.11 | 63.16 | 30.50 | 20.62 | 1.12 | 2.08 | 8.18 | 41.60 @ 50F |
| 1995 | 50.0 | 0.0 | 50.0 | 62.73 | 40.21 | 25.11 | 13.61 | 13.58 | 101.64 | 59.06 | 34.57 | 18.78 | 23.20 | 0.75 | 1.38 | 8.18 | 36.53 @ 75F |
| 1995 | 0.0 | 50.0 | 0.0 | 26.01 | 17.55 | 11.95 | 8.23 | 12.20 | 29.54 | 21.28 | 15.66 | 11.80 | 23.82 | 0.64 | 1.24 | 8.18 | 51.23 @100F |
| 1995 | 50.0 | 50.0 | 50.0 | 69.92 | 46.28 | 29.89 | 16.81 | 15.26 | 114.83 | 66.85 | 39.51 | 21.77 | 21.36 | 0.97 | 1.89 | 8.18 | |
| 1995 | 20.6 | 27.3 | 20.6 | 41.15 | 26.84 | 17.31 | 10.38 | 12.74 | 59.26 | 36.83 | 23.42 | 14.64 | 23.66 | 0.68 | 1.28 | 8.18 | |
| 2000 | 0.0 | 0.0 | 0.0 | 28.15 | 17.59 | 10.99 | 6.87 | 9.71 | 32.35 | 20.50 | 13.04 | 8.33 | 14.10 | 0.52 | 0.96 | 7.93 | 43.59 @ 0F |
| 2000 | 0.0 | 100.0 | 0.0 | 23.17 | 17.19 | 12.75 | 9.46 | 12.05 | 25.02 | 18.78 | 14.14 | 10.69 | 14.84 | 0.82 | 1.71 | 7.93 | 37.79 @ 25F |
| 2000 | 100.0 | 0.0 | 100.0 | 107.84 | 70.58 | 44.17 | 22.17 | 16.18 | 177.89 | 98.21 | 54.11 | 24.86 | 17.78 | 1.12 | 2.08 | 7.93 | 32.79 @ 50F |
| 2000 | 50.0 | 0.0 | 50.0 | 58.96 | 38.11 | 23.84 | 12.74 | 11.99 | 89.20 | 50.76 | 28.96 | 14.64 | 15.13 | 0.74 | 1.38 | 7.93 | 28.49 @ 75F |
| 2000 | 0.0 | 50.0 | 0.0 | 25.32 | 16.89 | 11.35 | 7.69 | 10.34 | 28.46 | 19.20 | 13.08 | 9.01 | 13.97 | 0.63 | 1.24 | 7.93 | 36.12 @100F |
| 2000 | 50.0 | 50.0 | 50.0 | 65.51 | 43.88 | 28.46 | 15.81 | 14.12 | 101.46 | 58.50 | 34.12 | 17.77 | 16.31 | 0.97 | 1.89 | 7.93 | |
| 2000 | 20.6 | 27.3 | 20.6 | 39.20 | 25.59 | 16.44 | 9.71 | 10.98 | 53.47 | 32.16 | 19.56 | 11.28 | 14.44 | 0.67 | 1.28 | 7.93 | |

TABLE 31

HIGH ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 5.0 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | LDGV | | | | | LDGT | | | | | -LDDV- | -LDDT- | -HDDV- | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0°F | 25°F | 50°F | 75°F | 100°F | 0°F | 25°F | 50°F | 75°F | 100°F | 0-100F | 0-100F | 0-100F | |
| 1980 | 0.0 | 0.0 | 0.0 | 2.50 | 2.18 | 1.91 | 1.68 | 1.26 | 3.35 | 2.95 | 2.62 | 2.33 | 1.81 | 2.09 | 2.76 | 38.90 | 4.74 ● 0F |
| 1980 | 0.0 | 100.0 | 0.0 | 3.11 | 2.75 | 2.45 | 2.18 | 1.57 | 4.17 | 3.74 | 3.37 | 3.04 | 2.21 | 2.44 | 3.30 | 38.90 | 4.42 ● 25F |
| 1980 | 100.0 | 0.0 | 100.0 | 2.48 | 2.34 | 2.24 | 2.16 | 1.71 | 2.94 | 2.94 | 2.96 | 3.00 | 2.47 | 2.63 | 3.57 | 38.90 | 4.13 ● 50F |
| 1980 | 50.0 | 0.0 | 50.0 | 2.58 | 2.36 | 2.18 | 2.02 | 1.57 | 3.26 | 3.07 | 2.93 | 2.82 | 2.27 | 2.34 | 3.12 | 38.90 | 3.87 ● 75F |
| 1980 | 0.0 | 50.0 | 0.0 | 2.95 | 2.60 | 2.30 | 2.04 | 1.49 | 3.98 | 3.55 | 3.17 | 2.85 | 2.12 | 2.25 | 3.00 | 38.90 | 2.79 ●100F |
| 1980 | 50.0 | 50.0 | 50.0 | 2.79 | 2.55 | 2.34 | 2.17 | 1.64 | 3.55 | 3.34 | 3.16 | 3.02 | 2.34 | 2.54 | 3.43 | 38.90 | |
| 1980 | 20.6 | 27.3 | 20.6 | 2.79 | 2.49 | 2.24 | 2.02 | 1.52 | 3.66 | 3.33 | 3.06 | 2.82 | 2.18 | 2.28 | 3.04 | 38.90 | |
| 1985 | 0.0 | 0.0 | 0.0 | 1.82 | 1.57 | 1.37 | 1.19 | 0.76 | 3.10 | 2.69 | 2.35 | 2.06 | 1.45 | 2.14 | 2.33 | 32.53 | 3.96 ● 0F |
| 1985 | 0.0 | 100.0 | 0.0 | 2.19 | 1.91 | 1.67 | 1.47 | 0.94 | 3.72 | 3.32 | 2.98 | 2.67 | 1.78 | 2.18 | 2.78 | 32.53 | 3.71 ● 25F |
| 1985 | 100.0 | 0.0 | 100.0 | 2.08 | 1.88 | 1.71 | 1.57 | 0.96 | 3.54 | 3.17 | 2.88 | 2.66 | 1.76 | 2.32 | 2.99 | 32.53 | 3.50 ● 50F |
| 1985 | 50.0 | 0.0 | 50.0 | 2.02 | 1.80 | 1.61 | 1.45 | 0.90 | 3.45 | 3.06 | 2.74 | 2.47 | 1.68 | 2.22 | 2.63 | 32.53 | 3.31 ● 75F |
| 1985 | 0.0 | 50.0 | 0.0 | 2.09 | 1.82 | 1.59 | 1.39 | 0.89 | 3.56 | 3.15 | 2.79 | 2.48 | 1.69 | 2.16 | 2.53 | 32.53 | 2.46 ●100F |
| 1985 | 50.0 | 50.0 | 50.0 | 2.14 | 1.89 | 1.69 | 1.52 | 0.95 | 3.63 | 3.25 | 2.93 | 2.66 | 1.77 | 2.25 | 2.88 | 32.53 | |
| 1985 | 20.6 | 27.3 | 20.6 | 2.05 | 1.80 | 1.59 | 1.41 | 0.89 | 3.50 | 3.10 | 2.76 | 2.47 | 1.68 | 2.18 | 2.56 | 32.53 | |
| 1988 | 0.0 | 0.0 | 0.0 | 1.68 | 1.45 | 1.25 | 1.08 | 0.63 | 3.12 | 2.69 | 2.33 | 2.01 | 1.41 | 1.81 | 2.05 | 27.71 | 3.89 ● 0F |
| 1988 | 0.0 | 100.0 | 0.0 | 2.02 | 1.71 | 1.46 | 1.25 | 0.79 | 3.62 | 3.21 | 2.85 | 2.53 | 1.70 | 1.81 | 2.43 | 27.71 | 3.68 ● 25F |
| 1988 | 100.0 | 0.0 | 100.0 | 2.00 | 1.77 | 1.57 | 1.41 | 0.80 | 3.75 | 3.26 | 2.86 | 2.54 | 1.62 | 1.93 | 2.62 | 27.71 | 3.48 ● 50F |
| 1988 | 50.0 | 0.0 | 50.0 | 1.91 | 1.67 | 1.47 | 1.30 | 0.75 | 3.57 | 3.10 | 2.70 | 2.38 | 1.57 | 1.86 | 2.30 | 27.71 | 3.30 ● 75F |
| 1988 | 0.0 | 50.0 | 0.0 | 1.92 | 1.64 | 1.41 | 1.21 | 0.74 | 3.51 | 3.07 | 2.70 | 2.37 | 1.62 | 1.81 | 2.22 | 27.71 | 2.08 ●100F |
| 1988 | 50.0 | 50.0 | 50.0 | 2.01 | 1.74 | 1.52 | 1.33 | 0.79 | 3.68 | 3.23 | 2.85 | 2.53 | 1.66 | 1.87 | 2.52 | 27.71 | |
| 1988 | 20.6 | 27.3 | 20.6 | 1.91 | 1.65 | 1.43 | 1.24 | 0.74 | 3.52 | 3.07 | 2.69 | 2.36 | 1.60 | 1.83 | 2.25 | 27.71 | |
| 1990 | 0.0 | 0.0 | 0.0 | 1.67 | 1.43 | 1.22 | 1.05 | 0.52 | 3.03 | 2.60 | 2.24 | 1.93 | 1.20 | 1.70 | 1.82 | 23.77 | 4.14 ● 0F |
| 1990 | 0.0 | 100.0 | 0.0 | 2.01 | 1.67 | 1.40 | 1.17 | 0.64 | 3.49 | 3.05 | 2.67 | 2.34 | 1.43 | 1.69 | 2.16 | 23.77 | 3.92 ● 25F |
| 1990 | 100.0 | 0.0 | 100.0 | 1.98 | 1.74 | 1.53 | 1.35 | 0.65 | 3.60 | 3.11 | 2.70 | 2.37 | 1.32 | 1.80 | 2.32 | 23.77 | 3.72 ● 50F |
| 1990 | 50.0 | 0.0 | 50.0 | 1.89 | 1.64 | 1.43 | 1.25 | 0.61 | 3.44 | 2.97 | 2.57 | 2.24 | 1.31 | 1.74 | 2.05 | 23.77 | 3.54 ● 75F |
| 1990 | 0.0 | 50.0 | 0.0 | 1.91 | 1.61 | 1.36 | 1.15 | 0.60 | 3.38 | 2.93 | 2.55 | 2.22 | 1.37 | 1.70 | 1.97 | 23.77 | 1.96 ●100F |
| 1990 | 50.0 | 50.0 | 50.0 | 1.99 | 1.70 | 1.46 | 1.26 | 0.64 | 3.54 | 3.08 | 2.69 | 2.36 | 1.37 | 1.74 | 2.24 | 23.77 | |
| 1990 | 20.6 | 27.3 | 20.6 | 1.90 | 1.62 | 1.38 | 1.19 | 0.60 | 3.40 | 2.94 | 2.55 | 2.22 | 1.34 | 1.72 | 2.00 | 23.77 | |
| 1995 | 0.0 | 0.0 | 0.0 | 1.68 | 1.43 | 1.22 | 1.03 | 0.44 | 2.83 | 2.40 | 2.05 | 1.74 | 0.91 | 1.61 | 1.66 | 19.93 | 4.48 ● 0F |
| 1995 | 0.0 | 100.0 | 0.0 | 2.06 | 1.67 | 1.36 | 1.10 | 0.55 | 3.22 | 2.71 | 2.29 | 1.94 | 1.07 | 1.59 | 1.97 | 19.93 | 4.26 ● 25F |
| 1995 | 100.0 | 0.0 | 100.0 | 1.95 | 1.71 | 1.49 | 1.30 | 0.56 | 3.15 | 2.70 | 2.33 | 2.01 | 0.97 | 1.68 | 2.11 | 19.93 | 4.06 ● 50F |
| 1995 | 50.0 | 0.0 | 50.0 | 1.88 | 1.63 | 1.41 | 1.22 | 0.52 | 3.09 | 2.64 | 2.26 | 1.94 | 0.97 | 1.64 | 1.87 | 19.93 | 3.86 ● 75F |
| 1995 | 0.0 | 50.0 | 0.0 | 1.94 | 1.61 | 1.33 | 1.10 | 0.51 | 3.13 | 2.65 | 2.24 | 1.90 | 1.03 | 1.60 | 1.80 | 19.93 | 1.92 ●100F |
| 1995 | 50.0 | 50.0 | 50.0 | 2.01 | 1.69 | 1.43 | 1.20 | 0.56 | 3.19 | 2.71 | 2.31 | 1.97 | 1.02 | 1.63 | 2.04 | 19.93 | |
| 1995 | 20.6 | 27.3 | 20.6 | 1.91 | 1.61 | 1.36 | 1.15 | 0.51 | 3.10 | 2.64 | 2.25 | 1.92 | 1.00 | 1.62 | 1.82 | 19.93 | |
| 2000 | 0.0 | 0.0 | 0.0 | 1.70 | 1.44 | 1.23 | 1.04 | 0.43 | 2.60 | 2.21 | 1.88 | 1.59 | 0.71 | 1.60 | 1.65 | 18.80 | 4.53 ● 0F |
| 2000 | 0.0 | 100.0 | 0.0 | 2.10 | 1.70 | 1.37 | 1.11 | 0.54 | 3.01 | 2.46 | 2.02 | 1.66 | 0.84 | 1.57 | 1.95 | 18.80 | 4.31 ● 25F |
| 2000 | 100.0 | 0.0 | 100.0 | 1.96 | 1.72 | 1.50 | 1.31 | 0.55 | 2.72 | 2.35 | 2.03 | 1.76 | 0.77 | 1.67 | 2.09 | 18.80 | 4.10 ● 50F |
| 2000 | 50.0 | 0.0 | 50.0 | 1.89 | 1.64 | 1.42 | 1.22 | 0.51 | 2.74 | 2.35 | 2.01 | 1.73 | 0.77 | 1.63 | 1.85 | 18.80 | 3.91 ● 75F |
| 2000 | 0.0 | 50.0 | 0.0 | 1.98 | 1.63 | 1.34 | 1.11 | 0.50 | 2.91 | 2.41 | 2.01 | 1.67 | 0.81 | 1.59 | 1.78 | 18.80 | 1.89 ●100F |
| 2000 | 50.0 | 50.0 | 50.0 | 2.03 | 1.71 | 1.44 | 1.21 | 0.55 | 2.86 | 2.41 | 2.02 | 1.71 | 0.81 | 1.62 | 2.02 | 18.80 | |
| 2000 | 20.6 | 27.3 | 20.6 | 1.93 | 1.63 | 1.37 | 1.15 | 0.50 | 2.83 | 2.38 | 2.01 | 1.69 | 0.79 | 1.61 | 1.80 | 18.80 | |

TABLE 31 : NOx AT 5.0 MPH.

TABLE 32

HIGH ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 10.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | LDGV 0°F | 25°F | 50°F | 75°F | 100°F | LDGT 0°F | 25°F | 50°F | 75°F | 100°F | -LDDV- 0-100F | -LDDT- 0-100F | -HDDV- 0-100F | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 2.19 | 1.92 | 1.68 | 1.48 | 1.11 | 2.82 | 2.50 | 2.23 | 1.99 | 1.54 | 1.74 | 2.29 | 32.27 | 4.98 ● 0F |
| 1980 | 0.0 | 100.0 | 0.0 | 2.71 | 2.41 | 2.15 | 1.92 | 1.37 | 3.52 | 3.17 | 2.87 | 2.60 | 1.89 | 2.02 | 2.74 | 32.27 | 4.64 ● 25F |
| 1980 | 100.0 | 0.0 | 100.0 | 2.25 | 2.11 | 2.00 | 1.92 | 1.48 | 2.54 | 2.54 | 2.54 | 2.57 | 2.09 | 2.19 | 2.96 | 32.27 | 4.34 ● 50F |
| 1980 | 50.0 | 0.0 | 50.0 | 2.30 | 2.10 | 1.93 | 1.79 | 1.37 | 2.78 | 2.63 | 2.50 | 2.41 | 1.93 | 1.94 | 2.59 | 32.27 | 4.07 ● 75F |
| 1980 | 0.0 | 50.0 | 0.0 | 2.58 | 2.28 | 2.02 | 1.79 | 1.30 | 3.30 | 3.00 | 2.70 | 2.43 | 1.81 | 1.86 | 2.49 | 32.27 | 2.93 ●100F |
| 1980 | 50.0 | 50.0 | 50.0 | 2.48 | 2.26 | 2.07 | 1.92 | 1.43 | 3.03 | 2.85 | 2.71 | 2.59 | 1.99 | 2.10 | 2.85 | 32.27 | |
| 1980 | 20.6 | 27.3 | 20.6 | 2.45 | 2.19 | 1.97 | 1.78 | 1.32 | 3.10 | 2.83 | 2.60 | 2.41 | 1.85 | 1.89 | 2.52 | 32.27 | |
| 1985 | 0.0 | 0.0 | 0.0 | 1.74 | 1.51 | 1.31 | 1.14 | 0.71 | 2.90 | 2.53 | 2.20 | 1.93 | 1.35 | 1.78 | 1.93 | 26.99 | 4.16 ● 0F |
| 1985 | 0.0 | 100.0 | 0.0 | 2.08 | 1.81 | 1.59 | 1.39 | 0.88 | 3.47 | 3.10 | 2.77 | 2.49 | 1.65 | 1.81 | 2.30 | 26.99 | 3.90 ● 25F |
| 1985 | 100.0 | 0.0 | 100.0 | 2.02 | 1.82 | 1.65 | 1.50 | 0.90 | 3.39 | 3.02 | 2.72 | 2.48 | 1.62 | 1.92 | 2.48 | 26.99 | 3.68 ● 50F |
| 1985 | 50.0 | 0.0 | 50.0 | 1.95 | 1.73 | 1.54 | 1.38 | 0.85 | 3.28 | 2.89 | 2.57 | 2.31 | 1.55 | 1.84 | 2.18 | 26.99 | 3.48 ● 75F |
| 1985 | 0.0 | 50.0 | 0.0 | 1.99 | 1.73 | 1.51 | 1.32 | 0.83 | 3.33 | 2.94 | 2.61 | 2.32 | 1.57 | 1.79 | 2.10 | 26.99 | 2.58 ●100F |
| 1985 | 50.0 | 50.0 | 50.0 | 2.05 | 1.82 | 1.62 | 1.45 | 0.89 | 3.43 | 3.06 | 2.75 | 2.49 | 1.64 | 1.87 | 2.39 | 26.99 | |
| 1985 | 20.6 | 27.3 | 20.6 | 1.97 | 1.72 | 1.52 | 1.34 | 0.84 | 3.29 | 2.91 | 2.58 | 2.30 | 1.56 | 1.81 | 2.12 | 26.99 | |
| 1988 | 0.0 | 0.0 | 0.0 | 1.66 | 1.43 | 1.23 | 1.06 | 0.61 | 3.04 | 2.61 | 2.26 | 1.95 | 1.34 | 1.50 | 1.70 | 22.99 | 4.09 ● 0F |
| 1988 | 0.0 | 100.0 | 0.0 | 1.99 | 1.69 | 1.43 | 1.23 | 0.76 | 3.50 | 3.09 | 2.74 | 2.44 | 1.62 | 1.50 | 2.02 | 22.99 | 3.86 ● 25F |
| 1988 | 100.0 | 0.0 | 100.0 | 1.98 | 1.75 | 1.55 | 1.39 | 0.77 | 3.68 | 3.18 | 2.78 | 2.45 | 1.53 | 1.60 | 2.17 | 22.99 | 3.66 ● 50F |
| 1988 | 50.0 | 0.0 | 50.0 | 1.89 | 1.65 | 1.45 | 1.28 | 0.72 | 3.49 | 3.02 | 2.62 | 2.30 | 1.49 | 1.55 | 1.91 | 22.99 | 3.47 ● 75F |
| 1988 | 0.0 | 50.0 | 0.0 | 1.90 | 1.62 | 1.38 | 1.19 | 0.71 | 3.39 | 2.97 | 2.60 | 2.29 | 1.54 | 1.50 | 1.84 | 22.99 | 2.18 ●100F |
| 1988 | 50.0 | 50.0 | 50.0 | 1.99 | 1.72 | 1.49 | 1.31 | 0.76 | 3.59 | 3.14 | 2.76 | 2.44 | 1.57 | 1.55 | 2.09 | 22.99 | |
| 1988 | 20.6 | 27.3 | 20.6 | 1.89 | 1.63 | 1.41 | 1.22 | 0.71 | 3.42 | 2.98 | 2.60 | 2.28 | 1.52 | 1.52 | 1.86 | 22.99 | |
| 1990 | 0.0 | 0.0 | 0.0 | 1.67 | 1.42 | 1.22 | 1.04 | 0.51 | 2.99 | 2.56 | 2.20 | 1.89 | 1.17 | 1.41 | 1.51 | 19.72 | 4.35 ● 0F |
| 1990 | 0.0 | 100.0 | 0.0 | 2.00 | 1.66 | 1.39 | 1.17 | 0.63 | 3.42 | 2.98 | 2.61 | 2.29 | 1.39 | 1.40 | 1.79 | 19.72 | 4.12 ● 25F |
| 1990 | 100.0 | 0.0 | 100.0 | 1.98 | 1.73 | 1.52 | 1.34 | 0.64 | 3.56 | 3.07 | 2.66 | 2.32 | 1.28 | 1.49 | 1.93 | 19.72 | 3.91 ● 50F |
| 1990 | 50.0 | 0.0 | 50.0 | 1.89 | 1.64 | 1.43 | 1.24 | 0.60 | 3.40 | 2.92 | 2.53 | 2.19 | 1.27 | 1.45 | 1.70 | 19.72 | 3.72 ● 75F |
| 1990 | 0.0 | 50.0 | 0.0 | 1.90 | 1.60 | 1.35 | 1.14 | 0.60 | 3.32 | 2.88 | 2.50 | 2.18 | 1.33 | 1.41 | 1.64 | 19.72 | 2.06 ●100F |
| 1990 | 50.0 | 50.0 | 50.0 | 1.99 | 1.70 | 1.46 | 1.26 | 0.64 | 3.49 | 3.02 | 2.63 | 2.30 | 1.34 | 1.45 | 1.86 | 19.72 | |
| 1990 | 20.6 | 27.3 | 20.6 | 1.89 | 1.61 | 1.38 | 1.18 | 0.60 | 3.34 | 2.89 | 2.50 | 2.17 | 1.30 | 1.42 | 1.66 | 19.72 | |
| 1995 | 0.0 | 0.0 | 0.0 | 1.69 | 1.44 | 1.22 | 1.04 | 0.44 | 2.83 | 2.40 | 2.05 | 1.74 | 0.91 | 1.34 | 1.38 | 16.54 | 4.70 ● 0F |
| 1995 | 0.0 | 100.0 | 0.0 | 2.07 | 1.68 | 1.36 | 1.11 | 0.55 | 3.22 | 2.71 | 2.29 | 1.93 | 1.07 | 1.32 | 1.63 | 16.54 | 4.48 ● 25F |
| 1995 | 100.0 | 0.0 | 100.0 | 1.96 | 1.71 | 1.50 | 1.31 | 0.56 | 3.15 | 2.70 | 2.32 | 2.00 | 0.96 | 1.40 | 1.75 | 16.54 | 4.26 ● 50F |
| 1995 | 50.0 | 0.0 | 50.0 | 1.89 | 1.63 | 1.41 | 1.22 | 0.52 | 3.09 | 2.64 | 2.26 | 1.94 | 0.96 | 1.36 | 1.55 | 16.54 | 4.06 ● 75F |
| 1995 | 0.0 | 50.0 | 0.0 | 1.95 | 1.61 | 1.34 | 1.11 | 0.51 | 3.13 | 2.64 | 2.24 | 1.90 | 1.02 | 1.33 | 1.49 | 16.54 | 2.01 ●100F |
| 1995 | 50.0 | 50.0 | 50.0 | 2.01 | 1.70 | 1.43 | 1.21 | 0.56 | 3.19 | 2.71 | 2.30 | 1.97 | 1.01 | 1.36 | 1.69 | 16.54 | |
| 1995 | 20.6 | 27.3 | 20.6 | 1.92 | 1.62 | 1.36 | 1.15 | 0.52 | 3.10 | 2.64 | 2.24 | 1.91 | 1.00 | 1.34 | 1.51 | 16.54 | |
| 2000 | 0.0 | 0.0 | 0.0 | 1.70 | 1.45 | 1.23 | 1.05 | 0.43 | 2.61 | 2.22 | 1.88 | 1.60 | 0.72 | 1.33 | 1.37 | 15.60 | 4.76 ● 0F |
| 2000 | 0.0 | 100.0 | 0.0 | 2.11 | 1.70 | 1.38 | 1.11 | 0.54 | 3.02 | 2.47 | 2.03 | 1.66 | 0.85 | 1.31 | 1.62 | 15.60 | 4.53 ● 25F |
| 2000 | 100.0 | 0.0 | 100.0 | 1.97 | 1.72 | 1.51 | 1.32 | 0.56 | 2.73 | 2.36 | 2.04 | 1.76 | 0.78 | 1.38 | 1.73 | 15.60 | 4.31 ● 50F |
| 2000 | 50.0 | 0.0 | 50.0 | 1.90 | 1.64 | 1.42 | 1.23 | 0.51 | 2.75 | 2.36 | 2.02 | 1.74 | 0.77 | 1.35 | 1.53 | 15.60 | 4.10 ● 75F |
| 2000 | 0.0 | 50.0 | 0.0 | 1.98 | 1.63 | 1.35 | 1.11 | 0.50 | 2.92 | 2.42 | 2.02 | 1.68 | 0.81 | 1.32 | 1.48 | 15.60 | 1.99 ●100F |
| 2000 | 50.0 | 50.0 | 50.0 | 2.04 | 1.71 | 1.44 | 1.21 | 0.55 | 2.87 | 2.41 | 2.03 | 1.71 | 0.81 | 1.34 | 1.67 | 15.60 | |
| 2000 | 20.6 | 27.3 | 20.6 | 1.94 | 1.63 | [illegible] | 1.16 | 0.50 | 2.84 | 2.39 | 2.01 | 1.70 | 0.79 | 1.33 | 1.49 | 15.60 | |

TABLE 32 : NOx AT 10.0 MPH

## TABLE 33

## HIGH ALTITUDE

### NOx EMISSION FACTORS (GRAMS/MILE) AT 19.6 MPH

| Cal. | Cold/Hot Start VMT Percentages | | | LDGV | | | | | LDGT | | | | | -LDDV- | -LDDT- | -HDDV- | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | PCCN | PCHC | PCCC | 0°F | 25°F | 50°F | 75°F | 100°F | 0°F | 25°F | 50°F | 75°F | 100°F | 0-100F | 0-100F | 0-100F | |
| 1980 | 0.0 | 0.0 | 0.0 | 2.46 | 2.16 | 1.90 | 1.67 | 1.24 | 3.11 | 2.77 | 2.48 | 2.22 | 1.72 | 1.34 | 1.77 | 24.91 | 5.44 @ 0F |
| 1980 | 0.0 | 100.0 | 0.0 | 3.03 | 2.70 | 2.41 | 2.17 | 1.54 | 3.90 | 3.52 | 3.19 | 2.91 | 2.11 | 1.56 | 2.11 | 24.91 | 5.07 @ 25F |
| 1980 | 100.0 | 0.0 | 100.0 | 2.58 | 2.41 | 2.27 | 2.17 | 1.65 | 2.86 | 2.84 | 2.85 | 2.87 | 2.31 | 1.69 | 2.28 | 24.91 | 4.74 @ 50F |
| 1980 | 50.0 | 0.0 | 50.0 | 2.62 | 2.38 | 2.18 | 2.02 | 1.53 | 3.10 | 2.93 | 2.79 | 2.69 | 2.14 | 1.50 | 2.00 | 24.91 | 4.45 @ 75F |
| 1980 | 0.0 | 50.0 | 0.0 | 2.88 | 2.55 | 2.27 | 2.02 | 1.46 | 3.71 | 3.33 | 3.00 | 2.71 | 2.02 | 1.44 | 1.92 | 24.91 | 3.20 @100F |
| 1980 | 50.0 | 50.0 | 50.0 | 2.80 | 2.55 | 2.34 | 2.17 | 1.60 | 3.38 | 3.18 | 3.02 | 2.89 | 2.21 | 1.62 | 2.20 | 24.91 | |
| 1980 | 20.6 | 27.3 | 20.6 | 2.76 | 2.47 | 2.22 | 2.01 | 1.48 | 3.44 | 3.15 | 2.90 | 2.69 | 2.06 | 1.46 | 1.95 | 24.91 | |
| 1985 | 0.0 | 0.0 | 0.0 | 2.07 | 1.79 | 1.56 | 1.36 | 0.84 | 3.43 | 2.98 | 2.60 | 2.27 | 1.58 | 1.37 | 1.49 | 20.83 | 4.54 @ 0F |
| 1985 | 0.0 | 100.0 | 0.0 | 2.47 | 2.15 | 1.88 | 1.65 | 1.04 | 4.07 | 3.64 | 3.26 | 2.93 | 1.93 | 1.39 | 1.78 | 20.83 | 4.26 @ 25F |
| 1985 | 100.0 | 0.0 | 100.0 | 2.43 | 2.18 | 1.96 | 1.79 | 1.06 | 4.05 | 3.59 | 3.22 | 2.93 | 1.89 | 1.49 | 1.92 | 20.83 | 4.02 @ 50F |
| 1985 | 50.0 | 0.0 | 50.0 | 2.33 | 2.06 | 1.84 | 1.64 | 1.00 | 3.89 | 3.42 | 3.04 | 2.72 | 1.82 | 1.42 | 1.68 | 20.83 | 3.80 @ 75F |
| 1985 | 0.0 | 50.0 | 0.0 | 2.36 | 2.05 | 1.79 | 1.57 | 0.98 | 3.91 | 3.46 | 3.07 | 2.73 | 1.84 | 1.38 | 1.62 | 20.83 | 2.82 @100F |
| 1985 | 50.0 | 50.0 | 50.0 | 2.45 | 2.16 | 1.92 | 1.72 | 1.05 | 4.06 | 3.62 | 3.24 | 2.93 | 1.91 | 1.44 | 1.85 | 20.83 | |
| 1985 | 20.6 | 27.3 | 20.6 | 2.34 | 2.05 | 1.80 | 1.59 | 0.98 | 3.89 | 3.43 | 3.04 | 2.71 | 1.82 | 1.40 | 1.64 | 20.83 | |
| 1988 | 0.0 | 0.0 | 0.0 | 2.01 | 1.73 | 1.49 | 1.28 | 0.73 | 3.65 | 3.14 | 2.71 | 2.34 | 1.60 | 1.16 | 1.31 | 17.74 | 4.47 @ 0F |
| 1988 | 0.0 | 100.0 | 0.0 | 2.40 | 2.04 | 1.73 | 1.48 | 0.91 | 4.19 | 3.71 | 3.28 | 2.92 | 1.92 | 1.16 | 1.56 | 17.74 | 4.22 @ 25F |
| 1988 | 100.0 | 0.0 | 100.0 | 2.41 | 2.12 | 1.88 | 1.68 | 0.92 | 4.45 | 3.84 | 3.34 | 2.94 | 1.81 | 1.23 | 1.68 | 17.74 | 4.00 @ 50F |
| 1988 | 50.0 | 0.0 | 50.0 | 2.30 | 2.00 | 1.76 | 1.54 | 0.86 | 4.21 | 3.63 | 3.15 | 2.75 | 1.77 | 1.19 | 1.48 | 17.74 | 3.79 @ 75F |
| 1988 | 0.0 | 50.0 | 0.0 | 2.29 | 1.95 | 1.67 | 1.43 | 0.86 | 4.07 | 3.56 | 3.12 | 2.74 | 1.83 | 1.16 | 1.42 | 17.74 | 2.38 @100F |
| 1988 | 50.0 | 50.0 | 50.0 | 2.41 | 2.08 | 1.81 | 1.58 | 0.91 | 4.32 | 3.77 | 3.31 | 2.93 | 1.87 | 1.20 | 1.62 | 17.74 | |
| 1988 | 20.6 | 27.3 | 20.6 | 2.29 | 1.97 | 1.70 | 1.47 | 0.85 | 4.12 | 3.58 | 3.12 | 2.73 | 1.80 | 1.17 | 1.44 | 17.74 | |
| 1990 | 0.0 | 0.0 | 0.0 | 2.03 | 1.73 | 1.48 | 1.27 | 0.62 | 3.62 | 3.10 | 2.66 | 2.29 | 1.41 | 1.09 | 1.17 | 15.22 | 4.75 @ 0F |
| 1990 | 0.0 | 100.0 | 0.0 | 2.43 | 2.02 | 1.69 | 1.42 | 0.77 | 4.13 | 3.60 | 3.15 | 2.76 | 1.67 | 1.08 | 1.38 | 15.22 | 4.51 @ 25F |
| 1990 | 100.0 | 0.0 | 100.0 | 2.41 | 2.11 | 1.86 | 1.64 | 0.78 | 4.32 | 3.71 | 3.21 | 2.80 | 1.54 | 1.15 | 1.49 | 15.22 | 4.28 @ 50F |
| 1990 | 50.0 | 0.0 | 50.0 | 2.30 | 2.00 | 1.74 | 1.51 | 0.73 | 4.12 | 3.54 | 3.05 | 2.65 | 1.53 | 1.12 | 1.31 | 15.22 | 4.06 @ 75F |
| 1990 | 0.0 | 50.0 | 0.0 | 2.31 | 1.95 | 1.64 | 1.39 | 0.72 | 4.01 | 3.48 | 3.02 | 2.62 | 1.60 | 1.09 | 1.26 | 15.22 | 2.25 @100F |
| 1990 | 50.0 | 50.0 | 50.0 | 2.42 | 2.07 | 1.77 | 1.53 | 0.78 | 4.22 | 3.66 | 3.18 | 2.78 | 1.61 | 1.12 | 1.44 | 15.22 | |
| 1990 | 20.6 | 27.3 | 20.6 | 2.30 | 1.96 | 1.68 | 1.44 | 0.72 | 4.05 | 3.49 | 3.02 | 2.62 | 1.57 | 1.10 | 1.28 | 15.22 | |
| 1995 | 0.0 | 0.0 | 0.0 | 2.06 | 1.75 | 1.49 | 1.27 | 0.54 | 3.45 | 2.93 | 2.49 | 2.12 | 1.10 | 1.03 | 1.07 | 12.76 | 5.14 @ 0F |
| 1995 | 0.0 | 100.0 | 0.0 | 2.53 | 2.05 | 1.67 | 1.35 | 0.67 | 3.93 | 3.30 | 2.78 | 2.35 | 1.30 | 1.02 | 1.26 | 12.76 | 4.89 @ 25F |
| 1995 | 100.0 | 0.0 | 100.0 | 2.39 | 2.09 | 1.83 | 1.60 | 0.69 | 3.84 | 3.29 | 2.83 | 2.44 | 1.17 | 1.08 | 1.35 | 12.76 | 4.66 @ 50F |
| 1995 | 50.0 | 0.0 | 50.0 | 2.31 | 1.99 | 1.72 | 1.49 | 0.64 | 3.77 | 3.22 | 2.75 | 2.36 | 1.17 | 1.05 | 1.20 | 12.76 | 4.43 @ 75F |
| 1995 | 0.0 | 50.0 | 0.0 | 2.38 | 1.97 | 1.63 | 1.35 | 0.63 | 3.81 | 3.22 | 2.73 | 2.31 | 1.24 | 1.02 | 1.15 | 12.76 | 2.20 @100F |
| 1995 | 50.0 | 50.0 | 50.0 | 2.46 | 2.07 | 1.75 | 1.48 | 0.68 | 3.88 | 3.30 | 2.81 | 2.40 | 1.23 | 1.05 | 1.31 | 12.76 | |
| 1995 | 20.6 | 27.3 | 20.6 | 2.34 | 1.97 | 1.67 | 1.41 | 0.63 | 3.78 | 3.21 | 2.73 | 2.33 | 1.21 | 1.03 | 1.17 | 12.76 | |
| 2000 | 0.0 | 0.0 | 0.0 | 2.08 | 1.77 | 1.50 | 1.28 | 0.52 | 3.19 | 2.71 | 2.30 | 1.95 | 0.88 | 1.03 | 1.05 | 12.04 | 5.20 @ 0F |
| 2000 | 0.0 | 100.0 | 0.0 | 2.58 | 2.08 | 1.68 | 1.36 | 0.66 | 3.69 | 3.02 | 2.48 | 2.03 | 1.03 | 1.01 | 1.25 | 12.04 | 4.95 @ 25F |
| 2000 | 100.0 | 0.0 | 100.0 | 2.41 | 2.10 | 1.84 | 1.61 | 0.68 | 3.33 | 2.88 | 2.49 | 2.15 | 0.95 | 1.07 | 1.34 | 12.04 | 4.71 @ 50F |
| 2000 | 50.0 | 0.0 | 50.0 | 2.32 | 2.01 | 1.74 | 1.50 | 0.63 | 3.36 | 2.88 | 2.47 | 2.12 | 0.94 | 1.04 | 1.18 | 12.04 | 4.48 @ 75F |
| 2000 | 0.0 | 50.0 | 0.0 | 2.42 | 2.00 | 1.65 | 1.36 | 0.61 | 3.56 | 2.96 | 2.46 | 2.05 | 0.99 | 1.02 | 1.14 | 12.04 | 2.17 @100F |
| 2000 | 50.0 | 50.0 | 50.0 | 2.49 | 2.09 | 1.76 | 1.48 | 0.67 | 3.51 | 2.95 | 2.48 | 2.09 | 0.99 | 1.04 | 1.29 | 12.04 | |
| 2000 | 20.6 | 27.3 | 20.6 | 2.37 | 1.99 | 1.68 | 1.42 | 0.62 | 3.47 | 2.92 | 2.46 | 2.08 | 0.97 | 1.03 | 1.15 | 12.04 | |

TABLE 33 : NOx AT 19.6 MPH.

# TABLE 34

## HIGH ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE) AT 35.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | LDGV 0°F | LDGV 25°F | LDGV 50°F | LDGV 75°F | LDGV 100°F | LDGT 0°F | LDGT 25°F | LDGT 50°F | LDGT 75°F | LDGT 100°F | -LDDV- 0-100F | -LDDT- 0-100F | -HDDV- 0-100F | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 3.30 | 2.89 | 2.54 | 2.24 | 1.67 | 4.28 | 3.80 | 3.39 | 3.04 | 2.35 | 1.16 | 1.53 | 21.60 | 6.18 @ 0F |
| 1980 | 0.0 | 100.0 | 0.0 | 4.06 | 3.62 | 3.23 | 2.90 | 2.07 | 5.36 | 4.83 | 4.38 | 3.98 | 2.89 | 1.36 | 1.83 | 21.60 | 5.76 @ 25F |
| 1980 | 100.0 | 0.0 | 100.0 | 3.42 | 3.20 | 3.03 | 2.90 | 2.22 | 3.89 | 3.87 | 3.88 | 3.92 | 3.17 | 1.46 | 1.98 | 21.60 | 5.38 @ 50F |
| 1980 | 50.0 | 0.0 | 50.0 | 3.49 | 3.18 | 2.92 | 2.71 | 2.05 | 4.23 | 4.00 | 3.82 | 3.68 | 2.93 | 1.30 | 1.73 | 21.60 | 5.05 @ 75F |
| 1980 | 0.0 | 50.0 | 0.0 | 3.87 | 3.42 | 3.04 | 2.71 | 1.96 | 5.10 | 4.57 | 4.11 | 3.72 | 2.77 | 1.25 | 1.67 | 21.60 | 3.63 @100F |
| 1980 | 50.0 | 50.0 | 50.0 | 3.74 | 3.41 | 3.13 | 2.90 | 2.14 | 4.62 | 4.35 | 4.13 | 3.95 | 3.03 | 1.41 | 1.91 | 21.60 | |
| 1980 | 20.6 | 27.3 | 20.6 | 3.69 | 3.30 | 2.97 | 2.69 | 1.99 | 4.72 | 4.31 | 3.97 | 3.68 | 2.82 | 1.26 | 1.69 | 21.60 | |
| 1985 | 0.0 | 0.0 | 0.0 | 2.71 | 2.35 | 2.04 | 1.78 | 1.11 | 4.54 | 3.95 | 3.44 | 3.01 | 2.10 | 1.19 | 1.29 | 18.07 | 5.16 @ 0F |
| 1985 | 0.0 | 100.0 | 0.0 | 3.24 | 2.82 | 2.47 | 2.17 | 1.37 | 5.41 | 4.83 | 4.33 | 3.89 | 2.57 | 1.21 | 1.54 | 18.07 | 4.84 @ 25F |
| 1985 | 100.0 | 0.0 | 100.0 | 3.17 | 2.84 | 2.57 | 2.34 | 1.40 | 5.32 | 4.73 | 4.25 | 3.88 | 2.52 | 1.29 | 1.66 | 18.07 | 4.56 @ 50F |
| 1985 | 50.0 | 0.0 | 50.0 | 3.05 | 2.70 | 2.41 | 2.16 | 1.31 | 5.13 | 4.52 | 4.02 | 3.61 | 2.42 | 1.23 | 1.46 | 18.07 | 4.31 @ 75F |
| 1985 | 0.0 | 50.0 | 0.0 | 3.10 | 2.69 | 2.35 | 2.06 | 1.30 | 5.19 | 4.59 | 4.07 | 3.62 | 2.45 | 1.20 | 1.40 | 18.07 | 3.21 @100F |
| 1985 | 50.0 | 50.0 | 50.0 | 3.20 | 2.83 | 2.52 | 2.26 | 1.39 | 5.36 | 4.78 | 4.29 | 3.88 | 2.55 | 1.25 | 1.60 | 18.07 | |
| 1985 | 20.6 | 27.3 | 20.6 | 3.07 | 2.69 | 2.36 | 2.09 | 1.30 | 5.15 | 4.54 | 4.03 | 3.60 | 2.42 | 1.21 | 1.42 | 18.07 | |
| 1988 | 0.0 | 0.0 | 0.0 | 2.62 | 2.25 | 1.94 | 1.67 | 0.96 | 4.78 | 4.11 | 3.55 | 3.07 | 2.10 | 1.01 | 1.14 | 15.39 | 5.08 @ 0F |
| 1988 | 0.0 | 100.0 | 0.0 | 3.13 | 2.65 | 2.25 | 1.93 | 1.19 | 5.50 | 4.86 | 4.31 | 3.83 | 2.54 | 1.01 | 1.35 | 15.39 | 4.80 @ 25F |
| 1988 | 100.0 | 0.0 | 100.0 | 3.13 | 2.76 | 2.45 | 2.18 | 1.20 | 5.80 | 5.01 | 4.37 | 3.85 | 2.39 | 1.07 | 1.45 | 15.39 | 4.54 @ 50F |
| 1988 | 50.0 | 0.0 | 50.0 | 2.98 | 2.60 | 2.28 | 2.01 | 1.13 | 5.50 | 4.75 | 4.13 | 3.61 | 2.34 | 1.03 | 1.28 | 15.39 | 4.31 @ 75F |
| 1988 | 0.0 | 50.0 | 0.0 | 2.98 | 2.54 | 2.17 | 1.86 | 1.12 | 5.34 | 4.67 | 4.09 | 3.60 | 2.42 | 1.01 | 1.23 | 15.39 | 2.71 @100F |
| 1988 | 50.0 | 50.0 | 50.0 | 3.13 | 2.70 | 2.35 | 2.05 | 1.19 | 5.65 | 4.94 | 4.34 | 3.84 | 2.46 | 1.04 | 1.40 | 15.39 | |
| 1988 | 20.6 | 27.3 | 20.6 | 2.97 | 2.56 | 2.21 | 1.92 | 1.12 | 5.39 | 4.69 | 4.09 | 3.59 | 2.38 | 1.02 | 1.25 | 15.39 | |
| 1990 | 0.0 | 0.0 | 0.0 | 2.63 | 2.25 | 1.92 | 1.64 | 0.81 | 4.71 | 4.04 | 3.47 | 2.99 | 1.85 | 0.95 | 1.01 | 13.21 | 5.40 @ 0F |
| 1990 | 0.0 | 100.0 | 0.0 | 3.15 | 2.63 | 2.19 | 1.84 | 1.00 | 5.39 | 4.70 | 4.11 | 3.61 | 2.19 | 0.94 | 1.20 | 13.21 | 5.12 @ 25F |
| 1990 | 100.0 | 0.0 | 100.0 | 3.12 | 2.74 | 2.41 | 2.12 | 1.01 | 5.62 | 4.84 | 4.19 | 3.66 | 2.02 | 1.00 | 1.29 | 13.21 | 4.86 @ 50F |
| 1990 | 50.0 | 0.0 | 50.0 | 2.98 | 2.59 | 2.25 | 1.96 | 0.95 | 5.36 | 4.61 | 3.98 | 3.46 | 2.00 | 0.97 | 1.14 | 13.21 | 4.61 @ 75F |
| 1990 | 0.0 | 50.0 | 0.0 | 3.00 | 2.53 | 2.13 | 1.80 | 0.94 | 5.24 | 4.54 | 3.94 | 3.43 | 2.10 | 0.94 | 1.10 | 13.21 | 2.55 @100F |
| 1990 | 50.0 | 50.0 | 50.0 | 3.14 | 2.68 | 2.30 | 1.98 | 1.01 | 5.50 | 4.77 | 4.15 | 3.63 | 2.11 | 0.97 | 1.24 | 13.21 | |
| 1990 | 20.6 | 27.3 | 20.6 | 2.98 | 2.54 | 2.17 | 1.85 | 0.94 | 5.28 | 4.55 | 3.94 | 3.43 | 2.05 | 0.95 | 1.11 | 13.21 | |
| 1995 | 0.0 | 0.0 | 0.0 | 2.67 | 2.27 | 1.93 | 1.64 | 0.69 | 4.47 | 3.80 | 3.23 | 2.75 | 1.43 | 0.89 | 0.92 | 11.07 | 5.84 @ 0F |
| 1995 | 0.0 | 100.0 | 0.0 | 3.27 | 2.65 | 2.16 | 1.75 | 0.87 | 5.09 | 4.28 | 3.61 | 3.05 | 1.68 | 0.88 | 1.09 | 11.07 | 5.56 @ 25F |
| 1995 | 100.0 | 0.0 | 100.0 | 3.10 | 2.71 | 2.37 | 2.07 | 0.89 | 4.98 | 4.27 | 3.67 | 3.16 | 1.52 | 0.93 | 1.17 | 11.07 | 5.29 @ 50F |
| 1995 | 50.0 | 0.0 | 50.0 | 2.99 | 2.58 | 2.23 | 1.93 | 0.83 | 4.88 | 4.17 | 3.57 | 3.06 | 1.52 | 0.91 | 1.04 | 11.07 | 5.04 @ 75F |
| 1995 | 0.0 | 50.0 | 0.0 | 3.08 | 2.55 | 2.11 | 1.75 | 0.81 | 4.94 | 4.18 | 3.54 | 3.00 | 1.61 | 0.89 | 1.00 | 11.07 | 2.50 @100F |
| 1995 | 50.0 | 50.0 | 50.0 | 3.18 | 2.68 | 2.26 | 1.91 | 0.88 | 5.03 | 4.27 | 3.64 | 3.11 | 1.60 | 0.91 | 1.13 | 11.07 | |
| 1995 | 20.6 | 27.3 | 20.6 | 3.03 | 2.55 | 2.16 | 1.82 | 0.81 | 4.90 | 4.16 | 3.54 | 3.02 | 1.57 | 0.90 | 1.01 | 11.07 | |
| 2000 | 0.0 | 0.0 | 0.0 | 2.69 | 2.29 | 1.95 | 1.65 | 0.67 | 4.13 | 3.50 | 2.97 | 2.52 | 1.13 | 0.89 | 0.92 | 10.44 | 5.90 @ 0F |
| 2000 | 0.0 | 100.0 | 0.0 | 3.34 | 2.69 | 2.17 | 1.76 | 0.85 | 4.77 | 3.91 | 3.20 | 2.63 | 1.34 | 0.87 | 1.08 | 10.44 | 5.62 @ 25F |
| 2000 | 100.0 | 0.0 | 100.0 | 3.11 | 2.72 | 2.38 | 2.08 | 0.88 | 4.31 | 3.72 | 3.22 | 2.79 | 1.23 | 0.93 | 1.16 | 10.44 | 5.35 @ 50F |
| 2000 | 50.0 | 0.0 | 50.0 | 3.01 | 2.60 | 2.25 | 1.94 | 0.81 | 4.34 | 3.72 | 3.20 | 2.74 | 1.22 | 0.91 | 1.03 | 10.44 | 5.09 @ 75F |
| 2000 | 0.0 | 50.0 | 0.0 | 3.13 | 2.58 | 2.13 | 1.76 | 0.79 | 4.61 | 3.83 | 3.19 | 2.65 | 1.28 | 0.88 | 0.99 | 10.44 | 2.47 @100F |
| 2000 | 50.0 | 50.0 | 50.0 | 3.22 | 2.71 | 2.28 | 1.92 | 0.87 | 4.54 | 3.82 | 3.21 | 2.71 | 1.28 | 0.90 | 1.12 | 10.44 | |
| 2000 | 20.6 | 27.3 | 20.6 | 3.07 | 2.58 | 2.17 | 1.83 | 0.80 | 4.48 | 3.78 | 3.18 | 2.69 | 1.25 | 0.89 | 1.00 | 10.44 | |

TABLE 34 : NOx AT 35.0 MPH.

# TABLE 35

## HIGH ALTITUDE

### NOx EMISSION FACTORS (GRAMS/MILE) AT 50.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | LDGV 0°F | LDGV 25°F | LDGV 50°F | LDGV 75°F | LDGV 100°F | LDGT 0°F | LDGT 25°F | LDGT 50°F | LDGT 75°F | LDGT 100°F | -LDDV- 0-100F | -LDDT- 0-100F | -HDDV- 0-100F | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 3.71 | 3.25 | 2.85 | 2.52 | 1.87 | 4.83 | 4.29 | 3.83 | 3.43 | 2.65 | 1.40 | 1.84 | 26.00 | 6.90 @ 0F |
| 1980 | 0.0 | 100.0 | 0.0 | 4.56 | 4.06 | 3.63 | 3.26 | 2.32 | 6.05 | 5.45 | 4.94 | 4.49 | 3.26 | 1.63 | 2.21 | 26.00 | 6.43 @ 25F |
| 1980 | 100.0 | 0.0 | 100.0 | 3.84 | 3.59 | 3.40 | 3.26 | 2.49 | 4.39 | 4.37 | 4.38 | 4.42 | 3.57 | 1.76 | 2.38 | 26.00 | 6.01 @ 50F |
| 1980 | 50.0 | 0.0 | 50.0 | 3.92 | 3.57 | 3.28 | 3.04 | 2.30 | 4.77 | 4.51 | 4.31 | 4.15 | 3.30 | 1.56 | 2.09 | 26.00 | 5.64 @ 75F |
| 1980 | 0.0 | 50.0 | 0.0 | 4.34 | 3.84 | 3.41 | 3.04 | 2.20 | 5.75 | 5.16 | 4.64 | 4.19 | 3.12 | 1.50 | 2.01 | 26.00 | 4.06 @100F |
| 1980 | 50.0 | 50.0 | 50.0 | 4.20 | 3.83 | 3.52 | 3.26 | 2.41 | 5.22 | 4.91 | 4.66 | 4.45 | 3.42 | 1.70 | 2.29 | 26.00 | |
| 1980 | 20.6 | 27.3 | 20.6 | 4.15 | 3.71 | 3.34 | 3.02 | 2.24 | 5.32 | 4.86 | 4.48 | 4.15 | 3.18 | 1.52 | 2.03 | 26.00 | |
| 1985 | 0.0 | 0.0 | 0.0 | 3.03 | 2.63 | 2.29 | 1.99 | 1.25 | 5.09 | 4.43 | 3.86 | 3.38 | 2.36 | 1.43 | 1.56 | 21.74 | 5.76 @ 0F |
| 1985 | 0.0 | 100.0 | 0.0 | 3.63 | 3.16 | 2.76 | 2.43 | 1.54 | 6.07 | 5.43 | 4.86 | 4.36 | 2.89 | 1.46 | 1.86 | 21.74 | 5.41 @ 25F |
| 1985 | 100.0 | 0.0 | 100.0 | 3.55 | 3.18 | 2.88 | 2.63 | 1.57 | 5.96 | 5.30 | 4.77 | 4.35 | 2.83 | 1.55 | 2.00 | 21.74 | 5.10 @ 50F |
| 1985 | 50.0 | 0.0 | 50.0 | 3.42 | 3.03 | 2.70 | 2.42 | 1.47 | 5.75 | 5.07 | 4.51 | 4.05 | 2.72 | 1.48 | 1.76 | 21.74 | 4.82 @ 75F |
| 1985 | 0.0 | 50.0 | 0.0 | 3.47 | 3.02 | 2.63 | 2.30 | 1.45 | 5.83 | 5.15 | 4.57 | 4.06 | 2.75 | 1.44 | 1.69 | 21.74 | 3.58 @100F |
| 1985 | 50.0 | 50.0 | 50.0 | 3.59 | 3.17 | 2.82 | 2.53 | 1.55 | 6.02 | 5.36 | 4.82 | 4.36 | 2.86 | 1.50 | 1.93 | 21.74 | |
| 1985 | 20.6 | 27.3 | 20.6 | 3.44 | 3.01 | 2.65 | 2.34 | 1.45 | 5.78 | 5.10 | 4.52 | 4.04 | 2.72 | 1.46 | 1.71 | 21.74 | |
| 1988 | 0.0 | 0.0 | 0.0 | 2.93 | 2.52 | 2.16 | 1.87 | 1.08 | 5.35 | 4.61 | 3.98 | 3.44 | 2.36 | 1.21 | 1.37 | 18.52 | 5.67 @ 0F |
| 1988 | 0.0 | 100.0 | 0.0 | 3.50 | 2.96 | 2.52 | 2.16 | 1.33 | 6.16 | 5.45 | 4.83 | 4.29 | 2.84 | 1.21 | 1.63 | 18.52 | 5.35 @ 25F |
| 1988 | 100.0 | 0.0 | 100.0 | 3.49 | 3.08 | 2.74 | 2.44 | 1.35 | 6.49 | 5.61 | 4.89 | 4.31 | 2.69 | 1.29 | 1.75 | 18.52 | 5.07 @ 50F |
| 1988 | 50.0 | 0.0 | 50.0 | 3.33 | 2.91 | 2.55 | 2.25 | 1.26 | 6.16 | 5.32 | 4.62 | 4.04 | 2.62 | 1.25 | 1.54 | 18.52 | 4.81 @ 75F |
| 1988 | 0.0 | 50.0 | 0.0 | 3.34 | 2.84 | 2.43 | 2.08 | 1.25 | 5.98 | 5.23 | 4.59 | 4.03 | 2.71 | 1.21 | 1.48 | 18.52 | 3.03 @100F |
| 1988 | 50.0 | 50.0 | 50.0 | 3.50 | 3.02 | 2.63 | 2.30 | 1.34 | 6.32 | 5.53 | 4.86 | 4.30 | 2.77 | 1.25 | 1.69 | 18.52 | |
| 1988 | 20.6 | 27.3 | 20.6 | 3.32 | 2.86 | 2.47 | 2.15 | 1.25 | 6.04 | 5.25 | 4.58 | 4.02 | 2.67 | 1.22 | 1.50 | 18.52 | |
| 1990 | 0.0 | 0.0 | 0.0 | 2.94 | 2.51 | 2.15 | 1.84 | 0.91 | 5.28 | 4.52 | 3.89 | 3.34 | 2.07 | 1.14 | 1.22 | 15.89 | 6.03 @ 0F |
| 1990 | 0.0 | 100.0 | 0.0 | 3.52 | 2.94 | 2.45 | 2.06 | 1.12 | 6.03 | 5.26 | 4.60 | 4.04 | 2.46 | 1.13 | 1.44 | 15.89 | 5.71 @ 25F |
| 1990 | 100.0 | 0.0 | 100.0 | 3.49 | 3.06 | 2.69 | 2.37 | 1.13 | 6.29 | 5.41 | 4.69 | 4.10 | 2.26 | 1.20 | 1.55 | 15.89 | 5.42 @ 50F |
| 1990 | 50.0 | 0.0 | 50.0 | 3.33 | 2.89 | 2.52 | 2.19 | 1.06 | 6.00 | 5.16 | 4.46 | 3.87 | 2.24 | 1.17 | 1.37 | 15.89 | 5.15 @ 75F |
| 1990 | 0.0 | 50.0 | 0.0 | 3.35 | 2.82 | 2.38 | 2.01 | 1.05 | 5.86 | 5.08 | 4.41 | 3.84 | 2.35 | 1.13 | 1.32 | 15.89 | 2.85 @100F |
| 1990 | 50.0 | 50.0 | 50.0 | 3.51 | 3.00 | 2.57 | 2.21 | 1.13 | 6.16 | 5.34 | 4.65 | 4.07 | 2.36 | 1.17 | 1.50 | 15.89 | |
| 1990 | 20.6 | 27.3 | 20.6 | 3.33 | 2.84 | 2.43 | 2.08 | 1.05 | 5.90 | 5.10 | 4.41 | 3.84 | 2.30 | 1.15 | 1.33 | 15.89 | |
| 1995 | 0.0 | 0.0 | 0.0 | 2.98 | 2.54 | 2.16 | 1.83 | 0.78 | 4.99 | 4.24 | 3.61 | 3.07 | 1.60 | 1.08 | 1.11 | 13.33 | 6.52 @ 0F |
| 1995 | 0.0 | 100.0 | 0.0 | 3.65 | 2.97 | 2.41 | 1.96 | 0.97 | 5.69 | 4.78 | 4.03 | 3.41 | 1.88 | 1.06 | 1.32 | 13.33 | 6.20 @ 25F |
| 1995 | 100.0 | 0.0 | 100.0 | 3.46 | 3.03 | 2.64 | 2.31 | 1.00 | 5.56 | 4.77 | 4.10 | 3.53 | 1.70 | 1.12 | 1.41 | 13.33 | 5.91 @ 50F |
| 1995 | 50.0 | 0.0 | 50.0 | 3.34 | 2.88 | 2.49 | 2.16 | 0.92 | 5.45 | 4.66 | 3.99 | 3.42 | 1.70 | 1.10 | 1.25 | 13.33 | 5.62 @ 75F |
| 1995 | 0.0 | 50.0 | 0.0 | 3.45 | 2.85 | 2.36 | 1.95 | 0.91 | 5.52 | 4.67 | 3.95 | 3.35 | 1.80 | 1.07 | 1.20 | 13.33 | 2.79 @100F |
| 1995 | 50.0 | 50.0 | 50.0 | 3.56 | 3.00 | 2.53 | 2.14 | 0.98 | 5.62 | 4.78 | 4.07 | 3.47 | 1.79 | 1.09 | 1.36 | 13.33 | |
| 1995 | 20.6 | 27.3 | 20.6 | 3.39 | 2.85 | 2.41 | 2.03 | 0.91 | 5.48 | 4.65 | 3.96 | 3.37 | 1.76 | 1.08 | 1.22 | 13.33 | |
| 2000 | 0.0 | 0.0 | 0.0 | 3.01 | 2.56 | 2.17 | 1.85 | 0.75 | 4.61 | 3.92 | 3.32 | 2.82 | 1.27 | 1.07 | 1.10 | 12.57 | 6.59 @ 0F |
| 2000 | 0.0 | 100.0 | 0.0 | 3.73 | 3.01 | 2.43 | 1.96 | 0.95 | 5.33 | 4.37 | 3.58 | 2.94 | 1.49 | 1.05 | 1.30 | 12.57 | 6.28 @ 25F |
| 2000 | 100.0 | 0.0 | 100.0 | 3.48 | 3.04 | 2.66 | 2.32 | 0.98 | 4.81 | 4.16 | 3.60 | 3.11 | 1.37 | 1.11 | 1.40 | 12.57 | 5.97 @ 50F |
| 2000 | 50.0 | 0.0 | 50.0 | 3.36 | 2.90 | 2.51 | 2.17 | 0.90 | 4.85 | 4.16 | 3.57 | 3.06 | 1.36 | 1.09 | 1.23 | 12.57 | 5.69 @ 75F |
| 2000 | 0.0 | 50.0 | 0.0 | 3.50 | 2.88 | 2.38 | 1.96 | 0.89 | 5.15 | 4.28 | 3.56 | 2.96 | 1.43 | 1.06 | 1.19 | 12.57 | 2.75 @100F |
| 2000 | 50.0 | 50.0 | 50.0 | 3.60 | 3.03 | 2.54 | 2.14 | 0.97 | 5.07 | 4.26 | 3.59 | 3.03 | 1.43 | 1.08 | 1.35 | 12.57 | |
| 2000 | 20.6 | 27.3 | 20.6 | 3.43 | 2.88 | 2.43 | 2.05 | 0.89 | 5.01 | 4.22 | 3.56 | 3.00 | 1.40 | 1.07 | 1.20 | 12.57 | |

TABLE 35 : NOx AT 50.0 MPH.

# TABLE 36

## HIGH ALTITUDE

## NOx EMISSION FACTORS (GRAMS/MILE) AT 55.0 MPH

| Cal. Year | Cold/Hot Start VMT Percentages PCCN | PCHC | PCCC | LDGV 0°F | LDGV 25°F | LDGV 50°F | LDGV 75°F | LDGV 100°F | LDGT 0°F | LDGT 25°F | LDGT 50°F | LDGT 75°F | LDGT 100°F | -LDDV- 0-100F | -LDDT- 0-100F | -HDDV- 0-100F | ----HDGV---- |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1980 | 0.0 | 0.0 | 0.0 | 4.00 | 3.51 | 3.08 | 2.72 | 2.02 | 5.23 | 4.64 | 4.14 | 3.71 | 2.87 | 1.60 | 2.11 | 29.69 | 7.14 @ 0F |
| 1980 | 0.0 | 100.0 | 0.0 | 4.93 | 4.39 | 3.92 | 3.52 | 2.51 | 6.54 | 5.90 | 5.34 | 4.85 | 3.53 | 1.86 | 2.52 | 29.69 | 6.65 @ 25F |
| 1980 | 100.0 | 0.0 | 100.0 | 4.15 | 3.88 | 3.68 | 3.52 | 2.69 | 4.74 | 4.72 | 4.74 | 4.78 | 3.86 | 2.01 | 2.72 | 29.69 | 6.22 @ 50F |
| 1980 | 50.0 | 0.0 | 50.0 | 4.23 | 3.85 | 3.54 | 3.28 | 2.49 | 5.16 | 4.88 | 4.66 | 4.49 | 3.57 | 1.78 | 2.38 | 29.69 | 5.84 @ 75F |
| 1980 | 0.0 | 50.0 | 0.0 | 4.69 | 4.15 | 3.69 | 3.28 | 2.38 | 6.23 | 5.58 | 5.02 | 4.53 | 3.37 | 1.72 | 2.29 | 29.69 | 4.20 @100F |
| 1980 | 50.0 | 50.0 | 50.0 | 4.54 | 4.14 | 3.80 | 3.52 | 2.60 | 5.64 | 5.31 | 5.04 | 4.82 | 3.70 | 1.94 | 2.62 | 29.69 | |
| 1980 | 20.6 | 27.3 | 20.6 | 4.48 | 4.01 | 3.61 | 3.27 | 2.42 | 5.76 | 5.26 | 4.84 | 4.49 | 3.44 | 1.74 | 2.32 | 29.69 | |
| 1985 | 0.0 | 0.0 | 0.0 | 3.28 | 2.84 | 2.47 | 2.15 | 1.34 | 5.50 | 4.78 | 4.17 | 3.65 | 2.55 | 1.63 | 1.78 | 24.83 | 5.96 @ 0F |
| 1985 | 0.0 | 100.0 | 0.0 | 3.92 | 3.41 | 2.98 | 2.62 | 1.66 | 6.56 | 5.86 | 5.25 | 4.71 | 3.12 | 1.66 | 2.12 | 24.83 | 5.60 @ 25F |
| 1985 | 100.0 | 0.0 | 100.0 | 3.83 | 3.44 | 3.11 | 2.84 | 1.69 | 6.43 | 5.72 | 5.15 | 4.70 | 3.06 | 1.77 | 2.28 | 24.83 | 5.27 @ 50F |
| 1985 | 50.0 | 0.0 | 50.0 | 3.69 | 3.27 | 2.91 | 2.61 | 1.59 | 6.21 | 5.48 | 4.87 | 4.38 | 2.93 | 1.69 | 2.01 | 24.83 | 4.98 @ 75F |
| 1985 | 0.0 | 50.0 | 0.0 | 3.75 | 3.26 | 2.84 | 2.49 | 1.57 | 6.30 | 5.57 | 4.93 | 4.39 | 2.97 | 1.65 | 1.93 | 24.83 | 3.70 @100F |
| 1985 | 50.0 | 50.0 | 50.0 | 3.87 | 3.42 | 3.05 | 2.73 | 1.68 | 6.50 | 5.79 | 5.20 | 4.71 | 3.09 | 1.72 | 2.20 | 24.83 | |
| 1985 | 20.6 | 27.3 | 20.6 | 3.71 | 3.25 | 2.86 | 2.53 | 1.57 | 6.24 | 5.51 | 4.88 | 4.36 | 2.94 | 1.66 | 1.95 | 24.83 | |
| 1988 | 0.0 | 0.0 | 0.0 | 3.16 | 2.72 | 2.34 | 2.01 | 1.16 | 5.78 | 4.97 | 4.29 | 3.71 | 2.55 | 1.38 | 1.56 | 21.15 | 5.86 @ 0F |
| 1988 | 0.0 | 100.0 | 0.0 | 3.77 | 3.20 | 2.72 | 2.33 | 1.43 | 6.65 | 5.88 | 5.21 | 4.63 | 3.07 | 1.38 | 1.86 | 21.15 | 5.54 @ 25F |
| 1988 | 100.0 | 0.0 | 100.0 | 3.77 | 3.33 | 2.95 | 2.63 | 1.45 | 7.00 | 6.05 | 5.28 | 4.66 | 2.90 | 1.47 | 2.00 | 21.15 | 5.25 @ 50F |
| 1988 | 50.0 | 0.0- | 50.0 | 3.60 | 3.14 | 2.75 | 2.47 | 1.36 | 6.64 | 5.74 | 4.99 | 4.46 | 2.83 | 1.42 | 1.76 | 21.15 | 4.82 @ 75F |
| 1988 | 0.0 | 50.0 | 0.0 | 3.60 | 3.07 | 2.62 | 2.31 | 1.35 | 6.45 | 5.65 | 4.95 | 4.47 | 2.93 | 1.38 | 1.69 | 21.15 | 3.13 @100F |
| 1988 | 50.0 | 50.0 | 50.0 | 3.77 | 3.26 | 2.84 | 2.55 | 1.44 | 6.83 | 5.97 | 5.25 | 4.78 | 2.99 | 1.43 | 1.93 | 21.15 | |
| 1988 | 20.6 | 27.3 | 20.6 | 3.59 | 3.09 | 2.67 | 2.37 | 1.35 | 6.51 | 5.67 | 4.95 | 4.45 | 2.88 | 1.40 | 1.71 | 21.15 | |
| 1990 | 0.0 | 0.0 | 0.0 | 3.17 | 2.71 | 2.32 | 1.98 | 0.98 | 5.69 | 4.88 | 4.19 | 3.61 | 2.23 | 1.30 | 1.39 | 18.15 | 6.24 @ 0F |
| 1990 | 0.0 | 100.0 | 0.0 | 3.80 | 3.17 | 2.65 | 2.22 | 1.21 | 6.51 | 5.68 | 4.97 | 4.36 | 2.65 | 1.29 | 1.65 | 18.15 | 5.91 @ 25F |
| 1990 | 100.0 | 0.0 | 100.0 | 3.76 | 3.30 | 2.90 | 2.56 | 1.22 | 6.78 | 5.84 | 5.06 | 4.42 | 2.44 | 1.37 | 1.77 | 18.15 | 5.61 @ 50F |
| 1990 | 50.0 | 0.0 | 50.0 | 3.60 | 3.12 | 2.71 | 2.37 | 1.15 | 6.48 | 5.57 | 4.81 | 4.18 | 2.42 | 1.33 | 1.56 | 18.15 | 5.33 @ 75F |
| 1990 | 0.0 | 50.0 | 0.0 | 3.62 | 3.05 | 2.57 | 2.17 | 1.14 | 6.33 | 5.48 | 4.76 | 4.14 | 2.54 | 1.30 | 1.51 | 18.15 | 2.95 @100F |
| 1990 | 50.0 | 50.0 | 50.0 | 3.78 | 3.23 | 2.77 | 2.39 | 1.22 | 6.65 | 5.76 | 5.01 | 4.39 | 2.55 | 1.33 | 1.71 | 18.15 | |
| 1990 | 20.6 | 27.3 | 20.6 | 3.60 | 3.07 | 2.62 | 2.25 | 1.13 | 6.37 | 5.50 | 4.76 | 4.14 | 2.48 | 1.31 | 1.52 | 18.15 | |
| 1995 | 0.0 | 0.0 | 0.0 | 3.22 | 2.74 | 2.33 | 1.98 | 0.84 | 5.38 | 4.58 | 3.90 | 3.32 | 1.73 | 1.23 | 1.27 | 15.22 | 6.75 @ 0F |
| 1995 | 0.0 | 100.0 | 0.0 | 3.94 | 3.20 | 2.60 | 2.11 | 1.05 | 6.14 | 5.16 | 4.35 | 3.68 | 2.03 | 1.21 | 1.50 | 15.22 | 6.42 @ 25F |
| 1995 | 100.0 | 0.0 | 100.0 | 3.73 | 3.26 | 2.85 | 2.50 | 1.08 | 6.00 | 5.15 | 4.42 | 3.81 | 1.84 | 1.28 | 1.61 | 15.22 | 6.11 @ 50F |
| 1995 | 50.0 | 0.0 | 50.0 | 3.60 | 3.11 | 2.69 | 2.33 | 1.00 | 5.88 | 5.03 | 4.30 | 3.69 | 1.84 | 1.25 | 1.43 | 15.22 | 5.82 @ 75F |
| 1995 | 0.0 | 50.0 | 0.0 | 3.72 | 3.07 | 2.54 | 2.11 | 0.98 | 5.96 | 5.04 | 4.26 | 3.62 | 1.95 | 1.22 | 1.38 | 15.22 | 2.89 @100F |
| 1995 | 50.0 | 50.0 | 50.0 | 3.84 | 3.23 | 2.73 | 2.30 | 1.06 | 5.07 | 5.15 | 4.39 | 3.75 | 1.93 | 1.25 | 1.56 | 15.22 | |
| 1995 | 20.6 | 27.3 | 20.6 | 3.65 | 3.08 | 2.60 | 2.20 | 0.98 | 5.91 | 5.02 | 4.27 | 3.64 | 1.90 | 1.23 | 1.39 | 15.22 | |
| 2000 | 0.0 | 0.0 | 0.0 | 3.25 | 2.76 | 2.35 | 1.99 | 0.81 | 4.98 | 4.23 | 3.59 | 3.04 | 1.37 | 1.22 | 1.26 | 14.35 | 6.82 @ 0F |
| 2000 | 0.0 | 100.0 | 0.0 | 4.02 | 3.25 | 2.62 | 2.12 | 1.03 | 5.76 | 4.71 | 3.86 | 3.17 | 1.61 | 1.20 | 1.49 | 14.35 | 6.49 @ 25F |
| 2000 | 100.0 | 0.0 | 100.0 | 3.75 | 3.28 | 2.87 | 2.51 | 1.06 | 5.19 | 4.49 | 3.88 | 3.36 | 1.48 | 1.27 | 1.59 | 14.35 | 6.18 @ 50F |
| 2000 | 50.0 | 0.0 | 50.0 | 3.62 | 3.13 | 2.71 | 2.34 | 0.98 | 5.24 | 4.49 | 3.85 | 3.31 | 1.47 | 1.25 | 1.41 | 14.35 | 5.89 @ 75F |
| 2000 | 0.0 | 50.0 | 0.0 | 3.78 | 3.11 | 2.57 | 2.12 | 0.96 | 5.56 | 4.62 | 3.84 | 3.20 | 1.54 | 1.21 | 1.36 | 14.35 | 2.85 @100F |
| 2000 | 50.0 | 50.0 | 50.0 | 3.89 | 3.26 | 2.75 | 2.31 | 1.05 | 5.47 | 4.60 | 3.87 | 3.26 | 1.55 | 1.24 | 1.54 | 14.35 | |
| 2000 | 20.6 | 27.3 | 20.6 | 3.70 | 3.11 | 2.62 | 2.21 | 0.96 | 5.41 | 4.55 | 3.84 | 3.24 | 1.51 | 1.23 | 1.38 | 14.35 | |

TABLE 36 : NOx AT 55.0 MPH.

# Appendix K

## EMISSION SENSITIVITY TABLES A/C AND LOAD

The following tables show the sensitivity of the MOBILE3 emission factors to variations in air conditioner usage, extra vehicle loads, and the percentage of vehicles towing trailers. The LDGT category is a weighted average of LDGT1s and LDGT2s. The following conditions are included:

Altitudes: Low, High

Air Conditioner Usage: 0%, 50%, 100%

Extra Load Percentage: 0%, 5%, 10%, 15%

Trailer Towing Percentage: 0%, 5%, 10%

## TABLE 1

## LOW ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 0 %

WET BULB TEMPERATURE = 66 F
DRY BULB TEMPERATURE = 71 F

| CAL. YEAR | EXTRA LOAD PERCENTAGE | LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0% | 5% | 10% | LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0% | 5% | 10% | EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE 0% | 5% | 10% |
|---|---|---|---|---|---|---|---|---|---|---|
| 1985 | 0 % | 3.58 | 3.66 | 3.73 | 6.80 | 6.94 | 7.07 | 4.66 | 4.73 | 4.81 |
| 1985 | 5 % | 3.59 | 3.66 | 3.73 | 6.82 | 6.95 | 7.08 | 4.66 | 4.74 | 4.81 |
| 1985 | 10 % | 3.60 | 3.67 | 3.74 | 6.83 | 6.96 | 7.10 | 4.67 | 4.75 | 4.82 |
| 1985 | 15 % | 3.60 | 3.68 | 3.75 | 6.84 | 6.98 | 7.11 | 4.68 | 4.75 | 4.83 |
| 1988 | 0 % | 2.76 | 2.81 | 2.87 | 5.53 | 5.64 | 5.76 | 3.55 | 3.61 | 3.67 |
| 1988 | 5 % | 2.76 | 2.82 | 2.87 | 5.54 | 5.65 | 5.77 | 3.55 | 3.61 | 3.67 |
| 1988 | 10 % | 2.76 | 2.82 | 2.88 | 5.55 | 5.66 | 5.78 | 3.56 | 3.62 | 3.68 |
| 1988 | 15 % | 2.77 | 2.83 | 2.88 | 5.56 | 5.67 | 5.79 | 3.56 | 3.62 | 3.68 |
| 1990 | 0 % | 2.38 | 2.43 | 2.48 | 4.84 | 4.94 | 5.05 | 3.02 | 3.07 | 3.12 |
| 1990 | 5 % | 2.38 | 2.43 | 2.48 | 4.85 | 4.95 | 5.06 | 3.02 | 3.07 | 3.13 |
| 1990 | 10 % | 2.39 | 2.44 | 2.49 | 4.85 | 4.96 | 5.07 | 3.03 | 3.08 | 3.13 |
| 1990 | 15 % | 2.39 | 2.44 | 2.49 | 4.86 | 4.97 | 5.08 | 3.03 | 3.08 | 3.14 |
| 1995 | 0 % | 1.84 | 1.88 | 1.92 | 3.53 | 3.61 | 3.69 | 2.24 | 2.28 | 2.32 |
| 1995 | 5 % | 1.85 | 1.88 | 1.92 | 3.54 | 3.62 | 3.70 | 2.25 | 2.28 | 2.32 |
| 1995 | 10 % | 1.85 | 1.89 | 1.92 | 3.55 | 3.63 | 3.71 | 2.25 | 2.29 | 2.33 |
| 1995 | 15 % | 1.85 | 1.89 | 1.93 | 3.55 | 3.63 | 3.71 | 2.25 | 2.29 | 2.33 |

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 71 F AMBIENT TEMPERATURE, AND 19.6 MPH AVERAGE SPEED.

TABLE 1 : THC @ 0 % A/C USAGE

## TABLE 2

## LOW ALTITUDE

### THC EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 50 %

WET BULB TEMPERATURE = 71 F
DRY BULB TEMPERATURE = 79 F

| CAL. YEAR | EXTRA LOAD PERCENTAGE | LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 0% | 5% | 10% | 0% | 5% | 10% | 0% | 5% | 10% |
| 1985 | 0 % | 3.57 | 3.65 | 3.72 | 6.79 | 6.93 | 7.06 | 4.65 | 4.73 | 4.80 |
| 1985 | 5 % | 3.58 | 3.65 | 3.72 | 6.81 | 6.94 | 7.08 | 4.66 | 4.73 | 4.81 |
| 1985 | 10 % | 3.59 | 3.66 | 3.73 | 6.82 | 6.95 | 7.09 | 4.66 | 4.74 | 4.82 |
| 1985 | 15 % | 3.59 | 3.67 | 3.74 | 6.83 | 6.97 | 7.10 | 4.67 | 4.75 | 4.82 |
| 1988 | 0 % | 2.74 | 2.79 | 2.85 | 5.53 | 5.65 | 5.76 | 3.53 | 3.60 | 3.66 |
| 1988 | 5 % | 2.74 | 2.80 | 2.85 | 5.54 | 5.66 | 5.78 | 3.54 | 3.60 | 3.66 |
| 1988 | 10 % | 2.74 | 2.80 | 2.86 | 5.55 | 5.67 | 5.79 | 3.54 | 3.61 | 3.67 |
| 1988 | 15 % | 2.75 | 2.81 | 2.86 | 5.56 | 5.68 | 5.80 | 3.55 | 3.61 | 3.67 |
| 1990 | 0 % | 2.35 | 2.40 | 2.44 | 4.83 | 4.94 | 5.05 | 3.00 | 3.05 | 3.10 |
| 1990 | 5 % | 2.35 | 2.40 | 2.45 | 4.84 | 4.95 | 5.05 | 3.00 | 3.05 | 3.11 |
| 1990 | 10 % | 2.36 | 2.40 | 2.45 | 4.85 | 4.96 | 5.06 | 3.01 | 3.06 | 3.11 |
| 1990 | 15 % | 2.36 | 2.41 | 2.46 | 4.86 | 4.96 | 5.07 | 3.01 | 3.06 | 3.12 |
| 1995 | 0 % | 1.79 | 1.83 | 1.87 | 3.49 | 3.57 | 3.65 | 2.21 | 2.24 | 2.28 |
| 1995 | 5 % | 1.80 | 1.83 | 1.87 | 3.50 | 3.58 | 3.66 | 2.21 | 2.25 | 2.28 |
| 1995 | 10 % | 1.80 | 1.84 | 1.87 | 3.51 | 3.58 | 3.66 | 2.21 | 2.25 | 2.29 |
| 1995 | 15 % | 1.80 | 1.84 | 1.88 | 3.51 | 3.59 | 3.67 | 2.21 | 2.25 | 2.29 |

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 79 F AMBIENT TEMPERATURE, AND 19.6 MPH AVERAGE SPEED.

## TABLE 3

## LOW ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 100 %

WET BULB TEMPERATURE = 79 F
DRY BULB TEMPERATURE = 86 F

| CAL. YEAR | EXTRA LOAD PERCENTAGE | LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 0% | 5% | 10% | 0% | 5% | 10% | 0% | 5% | 10% |
| 1985 | 0 % | 3.80 | 3.88 | 3.96 | 7.18 | 7.33 | 7.47 | 4.90 | 4.98 | 5.06 |
| 1985 | 5 % | 3.81 | 3.89 | 3.97 | 7.19 | 7.34 | 7.49 | 4.91 | 4.99 | 5.07 |
| 1985 | 10 % | 3.82 | 3.90 | 3.97 | 7.21 | 7.35 | 7.50 | 4.91 | 5.00 | 5.08 |
| 1985 | 15 % | 3.82 | 3.90 | 3.98 | 7.22 | 7.37 | 7.51 | 4.92 | 5.00 | 5.09 |
| 1988 | 0 % | 2.93 | 2.99 | 3.05 | 5.92 | 6.05 | 6.18 | 3.75 | 3.82 | 3.88 |
| 1988 | 5 % | 2.93 | 2.99 | 3.06 | 5.93 | 6.06 | 6.19 | 3.76 | 3.82 | 3.89 |
| 1988 | 10 % | 2.94 | 3.00 | 3.06 | 5.94 | 6.07 | 6.20 | 3.76 | 3.83 | 3.89 |
| 1988 | 15 % | 2.94 | 3.00 | 3.07 | 5.95 | 6.08 | 6.21 | 3.77 | 3.83 | 3.90 |
| 1990 | 0 % | 2.51 | 2.56 | 2.61 | 5.19 | 5.31 | 5.43 | 3.18 | 3.24 | 3.30 |
| 1990 | 5 % | 2.51 | 2.56 | 2.62 | 5.20 | 5.32 | 5.44 | 3.19 | 3.24 | 3.30 |
| 1990 | 10 % | 2.52 | 2.57 | 2.62 | 5.21 | 5.33 | 5.45 | 3.19 | 3.25 | 3.31 |
| 1990 | 15 % | 2.52 | 2.57 | 2.63 | 5.22 | 5.34 | 5.46 | 3.19 | 3.25 | 3.31 |
| 1995 | 0 % | 1.89 | 1.93 | 1.97 | 3.74 | 3.83 | 3.91 | 2.32 | 2.36 | 2.40 |
| 1995 | 5 % | 1.89 | 1.93 | 1.97 | 3.75 | 3.83 | 3.92 | 2.32 | 2.36 | 2.40 |
| 1995 | 10 % | 1.90 | 1.93 | 1.97 | 3.76 | 3.84 | 3.93 | 2.32 | 2.36 | 2.41 |
| 1995 | 15 % | 1.90 | 1.94 | 1.98 | 3.76 | 3.85 | 3.94 | 2.33 | 2.37 | 2.41 |

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 86 F AMBIENT TEMPERATURE, AND 19.6 MPH AVERAGE SPEED.

## TABLE 4

## LOW ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 0 %

WET BULB TEMPERATURE = 66 F
DRY BULB TEMPERATURE = 71 F

| CAL. YEAR | EXTRA LOAD PERCENTAGE | LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 0% | 5% | 10% | 0% | 5% | 10% | 0% | 5% | 10% |
| 1985 | 0 % | 29.30 | 32.76 | 36.21 | 52.46 | 58.01 | 63.56 | 37.11 | 40.56 | 44.01 |
| 1985 | 5 % | 29.69 | 33.19 | 36.69 | 53.09 | 58.72 | 64.35 | 37.50 | 41.00 | 44.49 |
| 1985 | 10 % | 30.07 | 33.62 | 37.17 | 53.73 | 59.43 | 65.14 | 37.88 | 41.43 | 44.97 |
| 1985 | 15 % | 30.45 | 34.05 | 37.65 | 54.36 | 60.14 | 65.92 | 38.27 | 41.86 | 45.46 |
| 1988 | 0 % | 23.07 | 26.16 | 29.25 | 43.35 | 48.54 | 53.72 | 28.40 | 31.47 | 34.54 |
| 1988 | 5 % | 23.39 | 26.53 | 29.67 | 43.91 | 49.17 | 54.43 | 28.73 | 31.84 | 34.95 |
| 1988 | 10 % | 23.72 | 26.90 | 30.09 | 44.47 | 49.80 | 55.14 | 29.05 | 32.21 | 35.37 |
| 1988 | 15 % | 24.04 | 27.27 | 30.50 | 45.02 | 50.43 | 55.84 | 29.38 | 32.58 | 35.78 |
| 1990 | 0 % | 20.33 | 23.21 | 26.10 | 38.33 | 43.23 | 48.13 | 24.17 | 26.99 | 29.81 |
| 1990 | 5 % | 20.63 | 23.56 | 26.48 | 38.85 | 43.82 | 48.79 | 24.46 | 27.32 | 30.18 |
| 1990 | 10 % | 20.93 | 23.90 | 26.87 | 39.36 | 44.41 | 49.45 | 24.76 | 27.66 | 30.56 |
| 1990 | 15 % | 21.23 | 24.24 | 27.25 | 39.88 | 44.99 | 50.11 | 25.05 | 28.00 | 30.94 |
| 1995 | 0 % | 16.58 | 19.04 | 21.51 | 29.16 | 33.35 | 37.53 | 18.04 | 20.35 | 22.66 |
| 1995 | 5 % | 16.83 | 19.33 | 21.83 | 29.60 | 33.84 | 38.09 | 18.28 | 20.62 | 22.97 |
| 1995 | 10 % | 17.09 | 19.62 | 22.16 | 30.03 | 34.34 | 38.65 | 18.52 | 20.90 | 23.27 |
| 1995 | 15 % | 17.34 | 19.92 | 22.49 | 30.46 | 34.83 | 39.21 | 18.76 | 21.17 | 23.58 |

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 71 F AMBIENT TEMPERATURE, AND 19.6 MPH AVERAGE SPEED.

## TABLE 5

## LOW ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 50 %

WET BULB TEMPERATURE = 71 F
DRY BULB TEMPERATURE = 79 F

| CAL. YEAR | EXTRA LOAD PERCENTAGE | LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 0% | 5% | 10% | 0% | 5% | 10% | 0% | 5% | 10% |
| 1985 | 0 % | 31.00 | 34.64 | 38.27 | 55.51 | 61.42 | 67.34 | 39.35 | 42.99 | 46.63 |
| 1985 | 5 % | 31.40 | 35.09 | 38.78 | 56.19 | 62.18 | 68.17 | 39.75 | 43.45 | 47.14 |
| 1985 | 10 % | 31.81 | 35.54 | 39.28 | 56.86 | 62.94 | 69.01 | 40.16 | 43.90 | 47.65 |
| 1985 | 15 % | 32.21 | 36.00 | 39.79 | 57.53 | 63.69 | 69.85 | 40.57 | 44.36 | 48.16 |
| 1988 | 0 % | 23.70 | 26.86 | 30.02 | 45.59 | 51.05 | 56.51 | 29.53 | 32.69 | 35.86 |
| 1988 | 5 % | 24.04 | 27.24 | 30.44 | 46.18 | 51.72 | 57.25 | 29.86 | 33.07 | 36.28 |
| 1988 | 10 % | 24.37 | 27.62 | 30.87 | 46.76 | 52.38 | 58.00 | 30.20 | 33.45 | 36.71 |
| 1988 | 15 % | 24.70 | 27.99 | 31.29 | 47.35 | 53.05 | 58.74 | 30.53 | 33.84 | 37.14 |
| 1990 | 0 % | 20.39 | 23.27 | 26.15 | 39.90 | 44.99 | 50.08 | 24.69 | 27.54 | 30.40 |
| 1990 | 5 % | 20.69 | 23.61 | 26.53 | 40.43 | 45.60 | 50.76 | 24.99 | 27.88 | 30.78 |
| 1990 | 10 % | 20.99 | 23.95 | 26.92 | 40.97 | 46.21 | 51.45 | 25.29 | 28.22 | 31.16 |
| 1990 | 15 % | 21.29 | 24.30 | 27.30 | 41.51 | 46.82 | 52.13 | 25.58 | 28.56 | 31.54 |
| 1995 | 0 % | 15.78 | 18.13 | 20.48 | 29.10 | 33.26 | 37.43 | 17.60 | 19.83 | 22.06 |
| 1995 | 5 % | 16.03 | 18.41 | 20.79 | 29.53 | 33.75 | 37.98 | 17.83 | 20.09 | 22.36 |
| 1995 | 10 % | 16.27 | 18.68 | 21.10 | 29.96 | 34.25 | 38.54 | 18.06 | 20.36 | 22.66 |
| 1995 | 15 % | 16.51 | 18.96 | 21.41 | 30.39 | 34.74 | 39.09 | 18.29 | 20.62 | 22.95 |

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 79 F AMBIENT TEMPERATURE, AND 19.6 MPH AVERAGE SPEED.

## TABLE 6

## LOW ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 100 %

WET BULB TEMPERATURE = 79 F
DRY BULB TEMPERATURE = 86 F

| CAL. YEAR | EXTRA LOAD PERCENTAGE | LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0% | 5% | 10% | LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0% | 5% | 10% | EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE 0% | 5% | 10% |
|---|---|---|---|---|---|---|---|---|---|---|
| 1985 | 0 % | 37.91 | 42.42 | 46.92 | 66.62 | 73.91 | 81.20 | 47.34 | 51.84 | 56.35 |
| 1985 | 5 % | 38.41 | 42.97 | 47.54 | 67.44 | 74.83 | 82.22 | 47.84 | 52.41 | 56.97 |
| 1985 | 10 % | 38.90 | 43.53 | 48.16 | 68.26 | 75.75 | 83.24 | 48.34 | 52.97 | 57.60 |
| 1985 | 15 % | 39.40 | 44.09 | 48.79 | 69.09 | 76.68 | 84.27 | 48.83 | 53.53 | 58.23 |
| 1988 | 0 % | 28.59 | 32.41 | 36.22 | 55.45 | 62.20 | 68.95 | 35.34 | 39.20 | 43.05 |
| 1988 | 5 % | 28.99 | 32.86 | 36.74 | 56.17 | 63.02 | 69.87 | 35.75 | 39.66 | 43.58 |
| 1988 | 10 % | 29.39 | 33.32 | 37.25 | 56.89 | 63.84 | 70.79 | 36.15 | 40.13 | 44.10 |
| 1988 | 15 % | 29.79 | 33.78 | 37.76 | 57.62 | 64.66 | 71.70 | 36.56 | 40.59 | 44.62 |
| 1990 | 0 % | 24.09 | 27.49 | 30.89 | 48.41 | 54.64 | 60.87 | 29.19 | 32.60 | 36.01 |
| 1990 | 5 % | 24.45 | 27.90 | 31.34 | 49.06 | 55.39 | 61.71 | 29.54 | 33.01 | 36.47 |
| 1990 | 10 % | 24.80 | 28.30 | 31.80 | 49.72 | 56.13 | 62.55 | 29.90 | 33.41 | 36.93 |
| 1990 | 15 % | 25.15 | 28.70 | 32.25 | 50.37 | 56.88 | 63.39 | 30.26 | 33.82 | 37.39 |
| 1995 | 0 % | 17.54 | 20.14 | 22.75 | 34.06 | 38.94 | 43.81 | 19.80 | 22.32 | 24.85 |
| 1995 | 5 % | 17.80 | 20.45 | 23.10 | 34.57 | 39.52 | 44.46 | 20.06 | 22.62 | 25.18 |
| 1995 | 10 % | 18.07 | 20.76 | 23.44 | 35.07 | 40.09 | 45.11 | 20.32 | 22.92 | 25.52 |
| 1995 | 15 % | 18.34 | 21.07 | 23.79 | 35.57 | 40.67 | 45.76 | 20.58 | 23.22 | 25.86 |

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 86 F AMBIENT TEMPERATURE, AND 19.6 MPH AVERAGE SPEED.

# TABLE 7

## LOW ALTITUDE

## NOx EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 0 %

WET BULB TEMPERATURE = 66 F
DRY BULB TEMPERATURE = 71 F

| CAL. YEAR | EXTRA LOAD PERCENTAGE | LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 0% | 5% | 10% | 0% | 5% | 10% | 0% | 5% | 10% |
| 1985 | 0 % | 2.04 | 2.07 | 2.10 | 3.42 | 3.48 | 3.53 | 3.47 | 3.50 | 3.53 |
| 1985 | 5 % | 2.04 | 2.08 | 2.11 | 3.44 | 3.49 | 3.54 | 3.47 | 3.51 | 3.54 |
| 1985 | 10 % | 2.05 | 2.08 | 2.12 | 3.45 | 3.50 | 3.55 | 3.48 | 3.51 | 3.55 |
| 1985 | 15 % | 2.06 | 2.09 | 2.13 | 3.46 | 3.51 | 3.56 | 3.49 | 3.52 | 3.56 |
| 1988 | 0 % | 1.72 | 1.75 | 1.78 | 3.19 | 3.24 | 3.30 | 2.95 | 2.98 | 3.01 |
| 1988 | 5 % | 1.72 | 1.75 | 1.79 | 3.20 | 3.25 | 3.31 | 2.95 | 2.98 | 3.02 |
| 1988 | 10 % | 1.73 | 1.76 | 1.79 | 3.21 | 3.26 | 3.32 | 2.96 | 2.99 | 3.02 |
| 1988 | 15 % | 1.73 | 1.77 | 1.80 | 3.22 | 3.27 | 3.33 | 2.97 | 3.00 | 3.03 |
| 1990 | 0 % | 1.59 | 1.62 | 1.66 | 2.95 | 3.01 | 3.06 | 2.65 | 2.68 | 2.71 |
| 1990 | 5 % | 1.60 | 1.63 | 1.66 | 2.96 | 3.02 | 3.07 | 2.66 | 2.69 | 2.72 |
| 1990 | 10 % | 1.61 | 1.64 | 1.67 | 2.97 | 3.03 | 3.08 | 2.66 | 2.69 | 2.72 |
| 1990 | 15 % | 1.61 | 1.64 | 1.67 | 2.98 | 3.04 | 3.09 | 2.67 | 2.70 | 2.73 |
| 1995 | 0 % | 1.46 | 1.49 | 1.52 | 2.47 | 2.52 | 2.56 | 2.28 | 2.31 | 2.34 |
| 1995 | 5 % | 1.47 | 1.49 | 1.52 | 2.48 | 2.52 | 2.57 | 2.29 | 2.32 | 2.34 |
| 1995 | 10 % | 1.47 | 1.50 | 1.53 | 2.49 | 2.53 | 2.58 | 2.29 | 2.32 | 2.35 |
| 1995 | 15 % | 1.48 | 1.50 | 1.53 | 2.49 | 2.54 | 2.59 | 2.30 | 2.33 | 2.35 |

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 71 F AMBIENT TEMPERATURE, 19.6 MPH AVERAGE SPEED, AND 75 GRAINS WATER/LB OF DRY AIR HUMIDITY.

## TABLE 8

## LOW ALTITUDE

### NOx EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 50 %

WET BULB TEMPERATURE = 71 F
DRY BULB TEMPERATURE = 79 F

| CAL. YEAR | EXTRA LOAD PERCENTAGE | LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 0% | 5% | 10% | 0% | 5% | 10% | 0% | 5% | 10% |
| 1985 | 0 % | 2.00 | 2.03 | 2.06 | 3.31 | 3.36 | 3.41 | 3.40 | 3.44 | 3.47 |
| 1985 | 5 % | 2.00 | 2.04 | 2.07 | 3.32 | 3.37 | 3.42 | 3.41 | 3.44 | 3.47 |
| 1985 | 10 % | 2.01 | 2.04 | 2.08 | 3.33 | 3.38 | 3.43 | 3.42 | 3.45 | 3.48 |
| 1985 | 15 % | 2.02 | 2.05 | 2.08 | 3.34 | 3.39 | 3.44 | 3.42 | 3.46 | 3.49 |
| 1988 | 0 % | 1.65 | 1.67 | 1.70 | 3.03 | 3.09 | 3.14 | 2.85 | 2.88 | 2.91 |
| 1988 | 5 % | 1.65 | 1.68 | 1.71 | 3.04 | 3.10 | 3.15 | 2.86 | 2.89 | 2.92 |
| 1988 | 10 % | 1.66 | 1.69 | 1.72 | 3.06 | 3.11 | 3.16 | 2.86 | 2.89 | 2.92 |
| 1988 | 15 % | 1.66 | 1.69 | 1.72 | 3.07 | 3.12 | 3.17 | 2.87 | 2.90 | 2.93 |
| 1990 | 0 % | 1.51 | 1.54 | 1.56 | 2.78 | 2.83 | 2.88 | 2.54 | 2.57 | 2.59 |
| 1990 | 5 % | 1.51 | 1.54 | 1.57 | 2.79 | 2.84 | 2.89 | 2.54 | 2.57 | 2.60 |
| 1990 | 10 % | 1.52 | 1.55 | 1.57 | 2.80 | 2.85 | 2.90 | 2.55 | 2.58 | 2.60 |
| 1990 | 15 % | 1.52 | 1.55 | 1.58 | 2.81 | 2.86 | 2.91 | 2.55 | 2.58 | 2.61 |
| 1995 | 0 % | 1.35 | 1.38 | 1.40 | 2.26 | 2.30 | 2.35 | 2.15 | 2.18 | 2.20 |
| 1995 | 5 % | 1.35 | 1.38 | 1.41 | 2.27 | 2.31 | 2.36 | 2.16 | 2.18 | 2.20 |
| 1995 | 10 % | 1.36 | 1.39 | 1.41 | 2.28 | 2.32 | 2.36 | 2.16 | 2.19 | 2.21 |
| 1995 | 15 % | 1.36 | 1.39 | 1.42 | 2.29 | 2.33 | 2.37 | 2.17 | 2.19 | 2.21 |

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 79 F AMBIENT TEMPERATURE, 19.6 MPH AVERAGE SPEED, AND 75 GRAINS WATER/LB OF DRY AIR HUMIDITY.

TABLE 8 : NOx @ 50 % A/C USAGE

## TABLE 9

## LOW ALTITUDE

### NOx EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 100 %

WET BULB TEMPERATURE = 79 F
DRY BULB TEMPERATURE = 86 F

| CAL. YEAR | EXTRA LOAD PERCENTAGE | LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 0% | 5% | 10% | 0% | 5% | 10% | 0% | 5% | 10% |
| 1985 | 0 % | 1.88 | 1.91 | 1.94 | 3.10 | 3.15 | 3.20 | 3.27 | 3.30 | 3.33 |
| 1985 | 5 % | 1.89 | 1.92 | 1.95 | 3.11 | 3.16 | 3.21 | 3.27 | 3.30 | 3.33 |
| 1985 | 10 % | 1.89 | 1.92 | 1.96 | 3.12 | 3.17 | 3.22 | 3.28 | 3.31 | 3.34 |
| 1985 | 15 % | 1.90 | 1.93 | 1.96 | 3.13 | 3.18 | 3.23 | 3.28 | 3.31 | 3.35 |
| 1988 | 0 % | 1.50 | 1.53 | 1.55 | 2.79 | 2.84 | 2.89 | 2.68 | 2.71 | 2.73 |
| 1988 | 5 % | 1.50 | 1.53 | 1.56 | 2.80 | 2.85 | 2.90 | 2.68 | 2.71 | 2.74 |
| 1988 | 10 % | 1.51 | 1.54 | 1.56 | 2.81 | 2.86 | 2.91 | 2.69 | 2.72 | 2.74 |
| 1988 | 15 % | 1.51 | 1.54 | 1.57 | 2.82 | 2.87 | 2.92 | 2.70 | 2.72 | 2.75 |
| 1990 | 0 % | 1.34 | 1.37 | 1.39 | 2.52 | 2.56 | 2.61 | 2.35 | 2.37 | 2.40 |
| 1990 | 5 % | 1.35 | 1.37 | 1.40 | 2.53 | 2.57 | 2.62 | 2.35 | 2.38 | 2.40 |
| 1990 | 10 % | 1.35 | 1.38 | 1.40 | 2.54 | 2.58 | 2.63 | 2.36 | 2.38 | 2.41 |
| 1990 | 15 % | 1.36 | 1.38 | 1.41 | 2.55 | 2.59 | 2.64 | 2.36 | 2.39 | 2.41 |
| 1995 | 0 % | 1.16 | 1.18 | 1.20 | 1.96 | 2.00 | 2.04 | 1.94 | 1.96 | 1.99 |
| 1995 | 5 % | 1.16 | 1.19 | 1.21 | 1.97 | 2.01 | 2.05 | 1.95 | 1.97 | 1.99 |
| 1995 | 10 % | 1.17 | 1.19 | 1.21 | 1.98 | 2.02 | 2.05 | 1.95 | 1.97 | 1.99 |
| 1995 | 15 % | 1.17 | 1.19 | 1.22 | 1.99 | 2.02 | 2.06 | 1.96 | 1.98 | 2.00 |

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 86 F AMBIENT TEMPERATURE, 19.6 MPH AVERAGE SPEED, AND 75 GRAINS WATER/LB OF DRY AIR HUMIDITY.

TABLE 9 : NOx @ 100 % A/C USAGE

## TABLE 10

## HIGH ALTITUDE

### THC EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 0 %

WET BULB TEMPERATURE = 66 F
DRY BULB TEMPERATURE = 71 F

| | | LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE | | |
|---|---|---|---|---|---|---|---|---|---|---|
| CAL. YEAR | EXTRA LOAD PERCENTAGE | 0% | 5% | 10% | 0% | 5% | 10% | 0% | 5% | 10% |
| 1985 | 0 % | 4.84 | 4.93 | 5.02 | 8.78 | 8.94 | 9.10 | 6.33 | 6.42 | 6.51 |
| 1985 | 5 % | 4.85 | 4.94 | 5.03 | 8.79 | 8.95 | 9.12 | 6.33 | 6.43 | 6.52 |
| 1985 | 10 % | 4.86 | 4.95 | 5.03 | 8.81 | 8.97 | 9.13 | 6.34 | 6.43 | 6.53 |
| 1985 | 15 % | 4.87 | 4.95 | 5.04 | 8.82 | 8.99 | 9.15 | 6.35 | 6.44 | 6.54 |
| 1988 | 0 % | 3.53 | 3.60 | 3.67 | 6.85 | 6.99 | 7.13 | 4.64 | 4.71 | 4.78 |
| 1988 | 5 % | 3.54 | 3.60 | 3.67 | 6.86 | 7.00 | 7.14 | 4.65 | 4.72 | 4.79 |
| 1988 | 10 % | 3.54 | 3.61 | 3.68 | 6.88 | 7.01 | 7.15 | 4.65 | 4.72 | 4.80 |
| 1988 | 15 % | 3.55 | 3.62 | 3.68 | 6.89 | 7.02 | 7.16 | 4.66 | 4.73 | 4.80 |
| 1990 | 0 % | 2.94 | 3.00 | 3.06 | 5.86 | 5.98 | 6.11 | 3.86 | 3.92 | 3.98 |
| 1990 | 5 % | 2.95 | 3.01 | 3.06 | 5.87 | 5.99 | 6.12 | 3.86 | 3.92 | 3.99 |
| 1990 | 10 % | 2.95 | 3.01 | 3.07 | 5.88 | 6.00 | 6.13 | 3.87 | 3.93 | 3.99 |
| 1990 | 15 % | 2.96 | 3.01 | 3.07 | 5.89 | 6.01 | 6.14 | 3.87 | 3.93 | 4.00 |
| 1995 | 0 % | 2.13 | 2.18 | 2.22 | 4.08 | 4.17 | 4.25 | 2.75 | 2.79 | 2.84 |
| 1995 | 5 % | 2.14 | 2.18 | 2.23 | 4.09 | 4.17 | 4.26 | 2.75 | 2.80 | 2.84 |
| 1995 | 10 % | 2.14 | 2.18 | 2.23 | 4.09 | 4.18 | 4.27 | 2.76 | 2.80 | 2.85 |
| 1995 | 15 % | 2.14 | 2.19 | 2.23 | 4.10 | 4.19 | 4.28 | 2.76 | 2.80 | 2.85 |

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 71 F AMBIENT TEMPERATURE, AND 19.6 MPH AVERAGE SPEED.

TABLE 10 : THC @ 0 % A/C USAGE

## TABLE 11

## HIGH ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 50 %

WET BULB TEMPERATURE = 71 F
DRY BULB TEMPERATURE = 79 F

| CAL. YEAR | EXTRA LOAD PERCENTAGE | LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 0% | 5% | 10% | 0% | 5% | 10% | 0% | 5% | 10% |
| 1985 | 0 % | 4.83 | 4.91 | 5.00 | 8.76 | 8.92 | 9.08 | 6.31 | 6.41 | 6.50 |
| 1985 | 5 % | 4.83 | 4.92 | 5.01 | 8.77 | 8.93 | 9.09 | 6.32 | 6.41 | 6.51 |
| 1985 | 10 % | 4.84 | 4.93 | 5.02 | 8.79 | 8.95 | 9.11 | 6.33 | 6.42 | 6.51 |
| 1985 | 15 % | 4.85 | 4.94 | 5.03 | 8.80 | 8.96 | 9.13 | 6.34 | 6.43 | 6.52 |
| 1988 | 0 % | 3.50 | 3.57 | 3.64 | 6.84 | 6.97 | 7.11 | 4.62 | 4.69 | 4.76 |
| 1988 | 5 % | 3.51 | 3.58 | 3.64 | 6.85 | 6.99 | 7.12 | 4.63 | 4.70 | 4.77 |
| 1988 | 10 % | 3.51 | 3.58 | 3.65 | 6.86 | 7.00 | 7.13 | 4.63 | 4.70 | 4.78 |
| 1988 | 15 % | 3.52 | 3.59 | 3.65 | 6.87 | 7.01 | 7.15 | 4.64 | 4.71 | 4.78 |
| 1990 | 0 % | 2.90 | 2.96 | 3.02 | 5.84 | 5.96 | 6.08 | 3.83 | 3.89 | 3.95 |
| 1990 | 5 % | 2.91 | 2.97 | 3.02 | 5.85 | 5.97 | 6.09 | 3.83 | 3.89 | 3.96 |
| 1990 | 10 % | 2.91 | 2.97 | 3.03 | 5.86 | 5.98 | 6.10 | 3.84 | 3.90 | 3.96 |
| 1990 | 15 % | 2.92 | 2.97 | 3.03 | 5.87 | 5.99 | 6.11 | 3.84 | 3.90 | 3.97 |
| 1995 | 0 % | 2.07 | 2.12 | 2.16 | 4.03 | 4.11 | 4.20 | 2.70 | 2.75 | 2.79 |
| 1995 | 5 % | 2.08 | 2.12 | 2.16 | 4.03 | 4.12 | 4.21 | 2.71 | 2.75 | 2.79 |
| 1995 | 10 % | 2.08 | 2.12 | 2.17 | 4.04 | 4.13 | 4.21 | 2.71 | 2.75 | 2.80 |
| 1995 | 15 % | 2.08 | 2.13 | 2.17 | 4.05 | 4.13 | 4.22 | 2.71 | 2.76 | 2.80 |

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 79 F AMBIENT TEMPERATURE, AND 19.6 MPH AVERAGE SPEED.

## TABLE 12

## HIGH ALTITUDE

THC EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 100 %

WET BULB TEMPERATURE = 79 F
DRY BULB TEMPERATURE = 86 F

| CAL. YEAR | EXTRA LOAD PERCENTAGE | LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0% | 5% | 10% | LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0% | 5% | 10% | EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE 0% | 5% | 10% |
|---|---|---|---|---|---|---|---|---|---|---|
| 1985 | 0 % | 5.10 | 5.20 | 5.30 | 9.20 | 9.37 | 9.54 | 6.61 | 6.71 | 6.81 |
| 1985 | 5 % | 5.11 | 5.21 | 5.30 | 9.21 | 9.39 | 9.56 | 6.62 | 6.72 | 6.82 |
| 1985 | 10 % | 5.12 | 5.22 | 5.31 | 9.23 | 9.40 | 9.58 | 6.63 | 6.73 | 6.83 |
| 1985 | 15 % | 5.13 | 5.23 | 5.32 | 9.24 | 9.42 | 9.59 | 6.64 | 6.74 | 6.84 |
| 1988 | 0 % | 3.73 | 3.80 | 3.88 | 7.25 | 7.40 | 7.55 | 4.87 | 4.94 | 5.02 |
| 1988 | 5 % | 3.73 | 3.81 | 3.88 | 7.27 | 7.41 | 7.56 | 4.87 | 4.95 | 5.03 |
| 1988 | 10 % | 3.74 | 3.81 | 3.89 | 7.28 | 7.43 | 7.58 | 4.88 | 4.96 | 5.04 |
| 1988 | 15 % | 3.75 | 3.82 | 3.90 | 7.29 | 7.44 | 7.59 | 4.88 | 4.96 | 5.04 |
| 1990 | 0 % | 3.09 | 3.15 | 3.22 | 6.22 | 6.35 | 6.48 | 4.04 | 4.10 | 4.17 |
| 1990 | 5 % | 3.10 | 3.16 | 3.22 | 6.23 | 6.36 | 6.49 | 4.04 | 4.11 | 4.17 |
| 1990 | 10 % | 3.10 | 3.16 | 3.23 | 6.24 | 6.37 | 6.50 | 4.05 | 4.11 | 4.18 |
| 1990 | 15 % | 3.11 | 3.17 | 3.23 | 6.25 | 6.38 | 6.51 | 4.05 | 4.12 | 4.19 |
| 1995 | 0 % | 2.19 | 2.23 | 2.28 | 4.28 | 4.37 | 4.47 | 2.83 | 2.88 | 2.92 |
| 1995 | 5 % | 2.19 | 2.24 | 2.28 | 4.29 | 4.38 | 4.48 | 2.83 | 2.88 | 2.93 |
| 1995 | 10 % | 2.19 | 2.24 | 2.29 | 4.29 | 4.39 | 4.48 | 2.84 | 2.88 | 2.93 |
| 1995 | 15 % | 2.20 | 2.24 | 2.29 | 4.30 | 4.40 | 4.49 | 2.84 | 2.89 | 2.93 |

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 86 F AMBIENT TEMPERATURE, AND 19.6 MPH AVERAGE SPEED.

## TABLE 13

## HIGH ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 0 %

WET BULB TEMPERATURE = 66 F
DRY BULB TEMPERATURE = 71 F

| CAL. YEAR | EXTRA LOAD PERCENTAGE | LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 0% | 5% | 10% | 0% | 5% | 10% | 0% | 5% | 10% |
| 1985 | 0 % | 45.01 | 50.39 | 55.77 | 73.19 | 80.81 | 88.43 | 55.98 | 61.13 | 66.28 |
| 1985 | 5 % | 45.60 | 51.06 | 56.51 | 74.07 | 81.79 | 89.51 | 56.55 | 61.77 | 66.99 |
| 1985 | 10 % | 46.19 | 51.72 | 57.26 | 74.94 | 82.76 | 90.59 | 57.13 | 62.42 | 67.71 |
| 1985 | 15 % | 46.78 | 52.39 | 58.00 | 75.81 | 83.74 | 91.67 | 57.70 | 63.06 | 68.43 |
| 1988 | 0 % | 35.26 | 40.02 | 44.78 | 57.03 | 63.68 | 70.34 | 41.83 | 46.27 | 50.72 |
| 1988 | 5 % | 35.76 | 40.59 | 45.42 | 57.75 | 64.50 | 71.25 | 42.30 | 46.81 | 51.32 |
| 1988 | 10 % | 36.26 | 41.16 | 46.06 | 58.47 | 65.31 | 72.16 | 42.77 | 47.34 | 51.92 |
| 1988 | 15 % | 36.76 | 41.73 | 46.70 | 59.19 | 66.12 | 73.06 | 43.24 | 47.88 | 52.52 |
| 1990 | 0 % | 31.31 | 35.76 | 40.22 | 48.92 | 55.03 | 61.14 | 35.45 | 39.51 | 43.57 |
| 1990 | 5 % | 31.77 | 36.29 | 40.81 | 49.56 | 55.76 | 61.96 | 35.88 | 40.00 | 44.12 |
| 1990 | 10 % | 32.24 | 36.82 | 41.41 | 50.21 | 56.49 | 62.78 | 36.30 | 40.48 | 44.66 |
| 1990 | 15 % | 32.70 | 37.35 | 42.00 | 50.85 | 57.23 | 63.60 | 36.72 | 40.96 | 45.20 |
| 1995 | 0 % | 26.22 | 30.12 | 34.02 | 35.27 | 40.30 | 45.32 | 26.71 | 30.05 | 33.40 |
| 1995 | 5 % | 26.62 | 30.58 | 34.54 | 35.79 | 40.89 | 45.99 | 27.05 | 30.45 | 33.85 |
| 1995 | 10 % | 27.03 | 31.04 | 35.06 | 36.31 | 41.49 | 46.66 | 27.40 | 30.85 | 34.30 |
| 1995 | 15 % | 27.43 | 31.50 | 35.58 | 36.83 | 42.08 | 47.33 | 27.74 | 31.24 | 34.75 |

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 71 F AMBIENT TEMPERATURE, AND 19.6 MPH AVERAGE SPEED.

## TABLE 14

## HIGH ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 50 %

WET BULB TEMPERATURE = 71 F
DRY BULB TEMPERATURE = 79 F

| CAL. YEAR | EXTRA LOAD PERCENTAGE | LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 0% | 5% | 10% | 0% | 5% | 10% | 0% | 5% | 10% |
| 1985 | 0 % | 47.86 | 53.56 | 59.25 | 77.40 | 85.50 | 93.60 | 59.50 | 64.96 | 70.42 |
| 1985 | 5 % | 48.48 | 54.26 | 60.04 | 78.32 | 86.53 | 94.74 | 60.11 | 65.64 | 71.18 |
| 1985 | 10 % | 49.11 | 54.97 | 60.83 | 79.25 | 87.57 | 95.89 | 60.72 | 66.33 | 71.94 |
| 1985 | 15 % | 49.74 | 55.67 | 61.61 | 80.17 | 88.60 | 97.03 | 61.32 | 67.01 | 72.70 |
| 1988 | 0 % | 36.60 | 41.51 | 46.42 | 59.87 | 66.86 | 73.86 | 43.67 | 48.28 | 52.89 |
| 1988 | 5 % | 37.11 | 42.09 | 47.08 | 60.63 | 67.72 | 74.81 | 44.15 | 48.83 | 53.51 |
| 1988 | 10 % | 37.63 | 42.68 | 47.74 | 61.38 | 68.57 | 75.76 | 44.64 | 49.39 | 54.14 |
| 1988 | 15 % | 38.14 | 43.27 | 48.40 | 62.14 | 69.43 | 76.71 | 45.13 | 49.95 | 54.76 |
| 1990 | 0 % | 31.87 | 36.38 | 40.89 | 50.87 | 57.21 | 63.55 | 36.45 | 40.60 | 44.74 |
| 1990 | 5 % | 32.34 | 36.92 | 41.50 | 51.54 | 57.97 | 64.40 | 36.88 | 41.09 | 45.30 |
| 1990 | 10 % | 32.80 | 37.45 | 42.10 | 52.21 | 58.74 | 65.26 | 37.32 | 41.59 | 45.85 |
| 1990 | 15 % | 33.27 | 37.99 | 42.71 | 52.89 | 59.50 | 66.11 | 37.75 | 42.08 | 46.41 |
| 1995 | 0 % | 25.66 | 29.48 | 33.29 | 35.27 | 40.28 | 45.28 | 26.44 | 29.74 | 33.03 |
| 1995 | 5 % | 26.05 | 29.93 | 33.80 | 35.79 | 40.87 | 45.95 | 26.78 | 30.13 | 33.47 |
| 1995 | 10 % | 26.45 | 30.38 | 34.31 | 36.30 | 41.46 | 46.62 | 27.12 | 30.52 | 33.91 |
| 1995 | 15 % | 26.84 | 30.83 | 34.82 | 36.82 | 42.05 | 47.29 | 27.46 | 30.91 | 34.35 |

---

*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 79 F AMBIENT TEMPERATURE, AND 19.6 MPH AVERAGE SPEED.

TABLE 14 : CO @ 50 % A/C USAGE

# TABLE 15

## HIGH ALTITUDE

CO EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 100 %

WET BULB TEMPERATURE = 79 F
DRY BULB TEMPERATURE = 86 F

| CAL. YEAR | EXTRA LOAD PERCENTAGE | LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 0% | 5% | 10% | 0% | 5% | 10% | 0% | 5% | 10% |
| 1985 | 0 % | 58.08 | 65.06 | 72.04 | 92.44 | 102.37 | 112.29 | 71.19 | 77.88 | 84.57 |
| 1985 | 5 % | 58.84 | 65.92 | 73.00 | 93.56 | 103.62 | 113.69 | 71.92 | 78.71 | 85.49 |
| 1985 | 10 % | 59.60 | 66.78 | 73.96 | 94.68 | 104.88 | 115.08 | 72.66 | 79.54 | 86.42 |
| 1985 | 15 % | 60.36 | 67.64 | 74.92 | 95.80 | 106.14 | 116.47 | 73.40 | 80.37 | 87.35 |
| 1988 | 0 % | 43.64 | 49.50 | 55.36 | 72.00 | 80.54 | 89.09 | 51.70 | 57.24 | 62.79 |
| 1988 | 5 % | 44.25 | 50.20 | 56.15 | 72.92 | 81.58 | 90.25 | 52.28 | 57.91 | 63.54 |
| 1988 | 10 % | 44.87 | 50.90 | 56.94 | 73.84 | 82.62 | 91.41 | 52.87 | 58.58 | 64.28 |
| 1988 | 15 % | 45.48 | 51.61 | 57.73 | 74.76 | 83.66 | 92.57 | 53.46 | 59.24 | 65.03 |
| 1990 | 0 % | 37.20 | 42.47 | 47.73 | 60.99 | 68.65 | 76.32 | 42.55 | 47.44 | 52.33 |
| 1990 | 5 % | 37.75 | 43.09 | 48.44 | 61.80 | 69.57 | 77.35 | 43.06 | 48.02 | 52.99 |
| 1990 | 10 % | 38.30 | 43.72 | 49.14 | 62.61 | 70.49 | 78.38 | 43.57 | 48.61 | 53.64 |
| 1990 | 15 % | 38.84 | 44.35 | 49.85 | 63.42 | 71.41 | 79.41 | 44.08 | 49.19 | 54.30 |
| 1995 | 0 % | 28.36 | 32.57 | 36.79 | 40.80 | 46.59 | 52.38 | 29.44 | 33.13 | 36.82 |
| 1995 | 5 % | 28.79 | 33.07 | 37.35 | 41.40 | 47.27 | 53.15 | 29.82 | 33.57 | 37.32 |
| 1995 | 10 % | 29.23 | 33.57 | 37.91 | 42.00 | 47.96 | 53.93 | 30.20 | 34.01 | 37.81 |
| 1995 | 15 % | 29.66 | 34.07 | 38.48 | 42.59 | 48.65 | 54.70 | 30.58 | 34.44 | 38.30 |

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 86 F AMBIENT TEMPERATURE, AND 19.6 MPH AVERAGE SPEED.

TABLE 15 : CO @ 100 % A/C USAGE

## TABLE 16

## HIGH ALTITUDE

### NOx EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 0 %

WET BULB TEMPERATURE = 66 F
DRY BULB TEMPERATURE = 71 F

| CAL. YEAR | EXTRA LOAD PERCENTAGE | LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0% | 5% | 10% | LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE 0% | 5% | 10% | EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE 0% | 5% | 10% |
|---|---|---|---|---|---|---|---|---|---|---|
| 1985 | 0 % | 1.62 | 1.65 | 1.68 | 2.76 | 2.80 | 2.85 | 2.98 | 3.01 | 3.04 |
| 1985 | 5 % | 1.63 | 1.66 | 1.68 | 2.77 | 2.81 | 2.86 | 2.99 | 3.01 | 3.04 |
| 1985 | 10 % | 1.63 | 1.66 | 1.69 | 2.78 | 2.82 | 2.87 | 2.99 | 3.02 | 3.05 |
| 1985 | 15 % | 1.64 | 1.67 | 1.70 | 2.79 | 2.83 | 2.88 | 3.00 | 3.03 | 3.05 |
| 1988 | 0 % | 1.51 | 1.54 | 1.56 | 2.79 | 2.84 | 2.89 | 2.67 | 2.69 | 2.72 |
| 1988 | 5 % | 1.51 | 1.54 | 1.57 | 2.80 | 2.85 | 2.90 | 2.67 | 2.70 | 2.73 |
| 1988 | 10 % | 1.52 | 1.55 | 1.57 | 2.81 | 2.86 | 2.91 | 2.68 | 2.71 | 2.73 |
| 1988 | 15 % | 1.52 | 1.55 | 1.58 | 2.82 | 2.87 | 2.92 | 2.68 | 2.71 | 2.74 |
| 1990 | 0 % | 1.47 | 1.50 | 1.53 | 2.68 | 2.73 | 2.78 | 2.46 | 2.49 | 2.52 |
| 1990 | 5 % | 1.48 | 1.51 | 1.53 | 2.69 | 2.74 | 2.79 | 2.47 | 2.50 | 2.52 |
| 1990 | 10 % | 1.48 | 1.51 | 1.54 | 2.70 | 2.75 | 2.80 | 2.47 | 2.50 | 2.53 |
| 1990 | 15 % | 1.49 | 1.52 | 1.54 | 2.71 | 2.76 | 2.81 | 2.48 | 2.51 | 2.53 |
| 1995 | 0 % | 1.45 | 1.47 | 1.50 | 2.39 | 2.43 | 2.48 | 2.22 | 2.24 | 2.27 |
| 1995 | 5 % | 1.45 | 1.48 | 1.51 | 2.40 | 2.44 | 2.49 | 2.22 | 2.25 | 2.27 |
| 1995 | 10 % | 1.46 | 1.48 | 1.51 | 2.41 | 2.45 | 2.50 | 2.23 | 2.25 | 2.28 |
| 1995 | 15 % | 1.46 | 1.49 | 1.52 | 2.41 | 2.46 | 2.51 | 2.23 | 2.26 | 2.28 |

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 71 F AMBIENT TEMPERATURE, 19.6 MPH AVERAGE SPEED, AND 75 GRAINS WATER/LB OF DRY AIR HUMIDITY.

## TABLE 17

## HIGH ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 50 %

WET BULB TEMPERATURE = 71 F
DRY BULB TEMPERATURE = 79 F

| CAL. YEAR | EXTRA LOAD PERCENTAGE | LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 0% | 5% | 10% | 0% | 5% | 10% | 0% | 5% | 10% |
| 1985 | 0 % | 1.58 | 1.61 | 1.64 | 2.66 | 2.70 | 2.74 | 2.92 | 2.95 | 2.98 |
| 1985 | 5 % | 1.59 | 1.62 | 1.64 | 2.66 | 2.71 | 2.75 | 2.93 | 2.96 | 2.98 |
| 1985 | 10 % | 1.59 | 1.62 | 1.65 | 2.67 | 2.72 | 2.76 | 2.94 | 2.96 | 2.99 |
| 1985 | 15 % | 1.60 | 1.63 | 1.65 | 2.68 | 2.73 | 2.77 | 2.94 | 2.97 | 2.99 |
| 1988 | 0 % | 1.44 | 1.46 | 1.49 | 2.65 | 2.70 | 2.74 | 2.58 | 2.60 | 2.63 |
| 1988 | 5 % | 1.44 | 1.47 | 1.50 | 2.66 | 2.71 | 2.75 | 2.58 | 2.61 | 2.64 |
| 1988 | 10 % | 1.45 | 1.47 | 1.50 | 2.67 | 2.71 | 2.76 | 2.59 | 2.62 | 2.64 |
| 1988 | 15 % | 1.45 | 1.48 | 1.51 | 2.68 | 2.72 | 2.77 | 2.59 | 2.62 | 2.65 |
| 1990 | 0 % | 1.39 | 1.41 | 1.44 | 2.52 | 2.56 | 2.61 | 2.36 | 2.38 | 2.41 |
| 1990 | 5 % | 1.39 | 1.42 | 1.44 | 2.53 | 2.57 | 2.62 | 2.36 | 2.39 | 2.41 |
| 1990 | 10 % | 1.40 | 1.42 | 1.45 | 2.54 | 2.58 | 2.63 | 2.37 | 2.39 | 2.42 |
| 1990 | 15 % | 1.40 | 1.43 | 1.45 | 2.55 | 2.59 | 2.64 | 2.37 | 2.40 | 2.42 |
| 1995 | 0 % | 1.34 | 1.36 | 1.39 | 2.18 | 2.23 | 2.27 | 2.09 | 2.11 | 2.14 |
| 1995 | 5 % | 1.34 | 1.37 | 1.39 | 2.19 | 2.23 | 2.28 | 2.09 | 2.12 | 2.14 |
| 1995 | 10 % | 1.34 | 1.37 | 1.40 | 2.20 | 2.24 | 2.28 | 2.10 | 2.12 | 2.15 |
| 1995 | 15 % | 1.35 | 1.38 | 1.40 | 2.21 | 2.25 | 2.29 | 2.10 | 2.13 | 2.15 |

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*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 79 F AMBIENT TEMPERATURE, 19.6 MPH AVERAGE SPEED, AND 75 GRAINS WATER/LB OF DRY AIR HUMIDITY.

TABLE 17 : NOx @ 50 % A/C USAGE

## TABLE 18

## HIGH ALTITUDE

NOx EMISSION FACTORS (GRAMS/MILE)

AIR CONDITIONING USAGE = 100 %

WET BULB TEMPERATURE = 79 F
DRY BULB TEMPERATURE = 86 F

| CAL. YEAR | EXTRA LOAD PERCENTAGE | LDGV EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | LDGT EMISSION FACTORS @ TRAILER TOWING PERCENTAGE | | | EMISSION FACTORS FOR 8 VEHICLE TYPES @LDG TRAILER TOWING PERCENTAGE | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 0% | 5% | 10% | 0% | 5% | 10% | 0% | 5% | 10% |
| 1985 | 0 % | 1.48 | 1.51 | 1.53 | 2.48 | 2.52 | 2.56 | 2.81 | 2.83 | 2.86 |
| 1985 | 5 % | 1.49 | 1.51 | 1.54 | 2.49 | 2.53 | 2.57 | 2.81 | 2.84 | 2.86 |
| 1985 | 10 % | 1.49 | 1.52 | 1.54 | 2.50 | 2.54 | 2.58 | 2.82 | 2.84 | 2.87 |
| 1985 | 15 % | 1.50 | 1.52 | 1.55 | 2.50 | 2.54 | 2.58 | 2.82 | 2.85 | 2.87 |
| 1988 | 0 % | 1.30 | 1.32 | 1.35 | 2.43 | 2.47 | 2.51 | 2.42 | 2.45 | 2.47 |
| 1988 | 5 % | 1.30 | 1.33 | 1.35 | 2.44 | 2.48 | 2.52 | 2.43 | 2.45 | 2.48 |
| 1988 | 10 % | 1.31 | 1.33 | 1.36 | 2.44 | 2.49 | 2.53 | 2.43 | 2.46 | 2.48 |
| 1988 | 15 % | 1.31 | 1.34 | 1.36 | 2.45 | 2.50 | 2.54 | 2.44 | 2.46 | 2.49 |
| 1990 | 0 % | 1.23 | 1.25 | 1.27 | 2.27 | 2.31 | 2.35 | 2.18 | 2.21 | 2.23 |
| 1990 | 5 % | 1.23 | 1.25 | 1.28 | 2.28 | 2.32 | 2.36 | 2.19 | 2.21 | 2.23 |
| 1990 | 10 % | 1.24 | 1.26 | 1.28 | 2.29 | 2.33 | 2.37 | 2.19 | 2.21 | 2.24 |
| 1990 | 15 % | 1.24 | 1.26 | 1.29 | 2.30 | 2.34 | 2.38 | 2.20 | 2.22 | 2.24 |
| 1995 | 0 % | 1.15 | 1.17 | 1.19 | 1.89 | 1.93 | 1.97 | 1.89 | 1.91 | 1.93 |
| 1995 | 5 % | 1.15 | 1.17 | 1.19 | 1.90 | 1.94 | 1.97 | 1.89 | 1.91 | 1.93 |
| 1995 | 10 % | 1.15 | 1.18 | 1.20 | 1.91 | 1.94 | 1.98 | 1.90 | 1.92 | 1.94 |
| 1995 | 15 % | 1.16 | 1.18 | 1.20 | 1.91 | 1.95 | 1.99 | 1.90 | 1.92 | 1.94 |

---

*EMISSION FACTORS ARE CALCULATED FOR JANUARY 1 OF CALENDAR YEAR UNDER CONDITIONS OF 20.6 % COLD START VMT, 27.3 % HOT START VMT, 86 F AMBIENT TEMPERATURE, 19.6 MPH AVERAGE SPEED, AND 75 GRAINS WATER/LB OF DRY AIR HUMIDITY.

TABLE 18 : NOx @ 100 % A/C USAGE

APPENDIX L

# SIZE SPECIFIC TOTAL PARTICULATE EMISSION FACTORS FOR MOBILE SOURCES

Final Report

EPA Contract No. 68-03-1865
Work Assignment No. 1

DRAFT

Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Mobile Source Air Pollution Control
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August 1985

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# 1. INTRODUCTION

The following material was developed to predict total particulate emission factors for gasoline and diesel fueled on-road vehicles, trucks and motorcycles at various vehicle speeds for particles in the respirable size range (less than 10 microns). Particulate emissions from these vehicles may also be determined at other size intervals less than 10 microns (e.g., less than 7.5, 5, or 2.5 microns).

User inputs to the equations to determine these emission factors include area travel fractions by vehicle class, vehicle miles traveled, vehicle speed, particle size limits of interest and calendar year.

This report presents particulate emission factor equations as the sum of individual masses of lead salt, organic and sulfate components for leaded and unleaded gasoline fueled vehicles. Composite (i.e., total particulate mass) equations are presented for diesel fueled vehicles and motorcycles, and tire and brake wear particulate. These equations are subsequently accompanied by tabulated emission factors which may be inserted into the appropriate particulate component equations. Fleet sales fractions and travel fractions by model year are included for each vehicle class. The fractions within each vehicle class that are equipped with different emission control systems also are provided. Cumulative distributions of particle size for leaded and unleaded gasoline and diesel fuel are presented both graphically and tabularly. Also, for the benefit of the user, an example calculation of particulate emissions from light-duty vehicles is provided.

The procedure herein can be used to project automotive particulate emissions by those agencies developing State Implementation Plans for particulate matter or by other interested parties within or outside the EPA concerned with size specific particulate emission factor projections for mobile sources.

This document is an updated version of an April 1984 report prepared by the Environmental Protection Agency, Office of Mobile Sources. It has been revised to include estimates of travel fractions and fleet characteristics from the June 1984 EPA report, User's Guide to MOBILE3 (Mobile Source Emissions Model), EPA 460/3-84-002.[44/] Revised estimates of emission control technology fractions also have been included. The methodology presented in this document is consistent with the procedure outlined in the April 15, 1983 EPA report, Supplementary Guidelines for Lead Implementation Plans -- Updated Projections for Motor Vehicle Lead Emissions[1/] which also was recently updated by Energy and Environmental Analysis, Inc.[45/] That report can be used to project the lead component of total particulate emissions for vehicles using leaded and unleaded gasoline. In addition to the lead component, the methodology outlined in this document can be used to develop estimates of three other components of particulate emission factors. Emission factors for organics, sulfates on the Federal Test Procedure (FTP) cycle, and heavy-duty gasoline trucks came from the Draft Study of Particulate Emissions From Motor Vehicles (for Section 214 of the Clean Air Act), by the Environmental Sciences Research Laboratory, Office of Research and Development, U.S. EPA, July 1983.[8/] Sulfates on the Sulfate Emission Test (SET) cycle and motorcycle emission factors came from the March 1981 EPA report, Compilation of Air Pollutant Emission Factors: Highway Mobile Sources EPA-460-3-81-005.[2/] Light- and heavy-duty diesel particulate emission factors are referenced

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*/ = Reference at end of text.

from the Draft Diesel Particulate Study, Emission Control Technology Division, Office of Mobile Sources, Office of Air and Radiation, U.S. EPA, October 1983.[4/] Emission factor estimate updating is an ongoing process and, in many cases, these values are based on testing of only a few vehicles.

This document has been revised to reflect changes in the lead content of gasoline. On March 7, 1985, EPA issued regulations which require petroleum refiners to drop the average lead content of leaded gasoline to 0.5 g/gallon by July 31, 1985 and 0.1 g/gallon by January 1, 1986 to: 1) reduce the health hazards associated with lead, and 2) to discourage the practice of misfueling which deteriorates the efficiency of vehicle emission control systems. (See Federal Register, Volume 50, No. 45, March 7, 1985.)

# 2. PROJECTING SIZE SPECIFIC TOTAL PARTICULATE EMISSION FACTORS

This report provides a methodology to project areawide total particulate emissions from mobile sources in a given calendar year. Particulate emissions can consist of lead salts, organics and sulfate emissions. The relative amounts vary for different vehicle types, emission control strategies and vehicle operating modes. Analysis of lead particulate indicates that most of the exhausted lead appears as salts, PbClBr. Therefore, estimates of the mass of lead particulate will be considerably larger than those predicted by the lead document, which predicts the mass of lead alone. Organic emissions include both soluble organics and elemental carbon and are important contributors to total particulate emissions from all vehicles, especially diesels. Sulfate emissions, mostly from unleaded gasoline-fueled vehicles equipped with catalysts, also are important contributors to total vehicular particulate emissions.

Section 2.1 provides an overview of: 1) the methodology used to calculate total areawide particulate emissions, and 2) the computations required to estimate the individual emission factor components by vehicle category and type of particulate. The detailed emission factor component equations for light-duty vehicles and light-duty trucks are discussed in Section 2.2. Equations for heavy-duty vehicles are described in Section 2.3. Section 2.4 presents the calculations required for motorcycles and Section 2.5 provides brake and tire wear particulate emission factor components.

## 2.1 OVERVIEW OF METHODOLOGY

Areawide particulate emissions (shown in Equation (2-1)) are a function of calendar year, average vehicle speed, vehicle class travel fractions, the particle size range of interest and the vehicle class emissions associated with the calendar year and vehicle speed. With the exceptions of the vehicle class emission factors, all of the above parameters are inputs selected by the user on an areawide basis to obtain the desired output of mobile source particulate emissions for the area of interest.

$$EF_{pm,n,s} = \sum_{i=1}^{6} t_{i,n} EF_{i,n,s} + EF_{brakes} (M_B) + EF_{tires} \qquad (2\text{-}1)$$

where $EF_{pm,n,s}$ = size specific all-vehicle class total particulate emission factor on January 1 of calendar year n at vehicle speed s (g/mile)

i = vehicle class designator; 1 = light-duty vehicles (LDV), 2 = light-duty trucks I (LDT1), 3 = light-duty trucks II (LDT2), 4 = heavy-duty gas vehicles (HDGV), 5 = heavy-duty diesel vehicles (HDDV), 6 = motorcycles (MC)

s = vehicle speed; avg. Federal Test Procedure (FTP) = 19.6, avg. Sulfate Emissions Test (SET) = 34.8 (miles/hr); (Note: The FTP and SET are driving cycles used for the determination of emission factors.)

$t_{i,n}$ = area travel fraction of vehicle class i in calendar year n

$EF_{i,n,s}$ = particulate emission factor for vehicle class i in calendar year n at vehicle speed s (g/mile)

$EF_{brakes}$ = airborne brake wear particulate emission factor component = 0.0128 grams/mile; this emission factor component is assumed to be the same for all vehicle classes, vehicle speeds and calendar years (all i, s, and n) due to lack of separate information for each i, s, and n

$EF_{tires}$ = airborne tire wear particulate emission factor component = 0.002 grams/mile; this emission factor component is assumed to be the same for all vehicle classes, vehicle speeds and calendar years (all i, s, and n) due to lack of separate information for each i, s, and n

$M_B$ = fraction of airborne particles less than a user-specified size cutoff (0.1-10 $\mu$) that are attributable to vehicle brake wear, from Table 2-20 or Figure 2-4

The vehicle classes for which emission factor estimates may be obtained include: 1) light-duty vehicles (passenger cars), 2) light-duty trucks I (0-6000 lbs. GVWR), 3) light-duty trucks II (6001-8500 lbs. GVWR), 4) heavy-duty gas vehicles (greater than 8,501 lbs. GVWR), 5) heavy-duty diesel vehicles (greater than 8,501 lbs. GVWR), and 6) motorcycles.

The exhaust emission factors for each vehicle class for a given calendar year ($EF_{i,n,s}$) are broken down into component emission factors in Equation (2-2). The components represent the masses of lead salt, organic and sulfate emissions from both leaded and unleaded gasoline fueled vehicles and total particulate mass from diesel vehicles--all of which are multiplied by the fraction of total vehicles of a given model year designed for use on these three fuel types. The sum of these components for each model year is also multiplied by the fraction of the vehicle class travel (disaggregated by gasoline and diesel fuel types for all vehicle categories except light-duty vehicles) that is attributable to that model year in the calendar year of interest. For example, the component ($EF_{i,j,k,n,L}$) represents the emissions in grams per mile of lead salts (k=1) from vehicle class i emitted from model year j gasoline vehicles that are on the road in calendar year n and are designed for use on leaded fuel. These emission components must be summed up over the twenty model years prior to the calendar year of interest to include all the contributing fractions of emissions from vehicles on the road.

$$EF_{i,n,s} = \sum_{j=n-19}^{n} \Big[(EF_{i,j,k_1,n,L} + EF_{i,j,k_2,L} + EF_{i,j,k_3,L})(F_{L,i,j}) + (EF_{i,j,k_1,n,NL} + EF_{i,j,k_2,NL} + EF_{i,j,k_3,NL})(F_{NL,i,j})\Big]\, m_{i,j,G} + (EF_{i,j,D})(F_{D,i,j})\, m_{i,j,D} \qquad (2\text{-}2)$$

where $j$ = model year $j = n-19, n-18, \ldots, n-2, n-1, n$

$L$ = vehicles designed for use on leaded fuel

$NL$ = vehicles designed for use on unleaded fuel

$k$ = component of total particulate emission factor ($k_1$ = lead, $k_2$ = organic, $k_3$ = sulfate) expressed individually for gasoline vehicles and trucks (except motorcycles) and cumulatively for diesel vehicles and trucks and motorcycles

$F_{L,i,j}$ = fraction of the vehicle class i fleet designed for use on leaded gasoline in model year j

$F_{NL,i,j}$ = fraction of the vehicle class i fleet designed for use on unleaded gasoline in model year j

$F_{D,i,j}$ = fraction of the vehicle class i fleet designed for use on diesel fuel in model year j

$m_{i,j,G}$ = travel fraction for all gasoline vehicles in class i in model year j

$m_{i,j,D}$ = travel fraction for all diesel vehicles in class i in model year j

Component emission factors are derived for each vehicle class over different model years at average speeds of 19.6 mph (cyclic driving comparable to average speed of the Federal Test Procedure) and 34.8 mph (cruising conditions comparable to the average speed of the Sulfate Emissions Test). Emission factors for speeds between 19.6 mph and 34.8 mph can be linearly interpolated.

As the reader will note in the following sections, the calculation of these component emission factors is highly dependent on the assumptions made concerning particle size distribution. Distributions of particle size are different for leaded gasoline, unleaded gasoline and diesel fueled vehicles as well as brake and tire wear particles. They are also different for various conditions of vehicle driving cycle (speed) and load. For the purposes of this report, however, typical or average conditions are presented to facilitate the determination of vehicle particulate emissions versus particle size.

Particle size distributions for leaded, unleaded and diesel fueled vehicles and brake wear particles are contained in Table 2-20 and also in Figures 2-1, 2-2, 2-3, and 2-4 (no distributions are available for tire wear particulate). Typically, the average diameter of particles emitted from vehicles fueled with leaded gasoline are the largest, particles emitted from vehicles fueled with unleaded gasoline are somewhat smaller and particles emitted from diesel fueled vehicles are smaller yet. Some of the data for the size distribution of lead particles are conflicting (e.g., Moran et al, 1971 which shows a larger fraction of the lead in smaller size ranges than the other leaded gasoline references). Thus, these data are less certain than those for unleaded and diesel particles. References for those reports used in the determination of particle size distributions of leaded, unleaded and diesel fueled vehicle emissions and brake wear emissions are listed in Table 2-20.

Values for $M_L$, $M_{NL,C}$, $M_{NL,NC}$, $M_D$, and $M_B$ should be expressed as dimensionless fractions of total particulate by weight emitted below a given size cutoff. Values may be read directly from Table 2-20 for the data points listed therein, or may be read off the graphs of continuous cumulative particle size distributions in Figures 2-1, 2-2, 2-3, and 2-4 for interpolated size cutoffs (e.g., 6.5 μ, 2.5μ).

## 2.2 LIGHT-DUTY VEHICLES AND LIGHT-DUTY TRUCKS I AND II

This section presents the lead, sulfate and organic emission factor equations for gasoline-fueled light-duty vehicles and light-duty trucks I and II. In addition, composite particulate emission factors are presented for light-duty diesel vehicles and light-duty diesel trucks. The fractions of light-duty vehicles and light-duty trucks by model year which operate on leaded or unleaded gasoline or diesel fuel are presented in Tables 2-4, 2-9, and 2-12. Tables 2-5, 2-10, 2-13, and 2-14 contain information on light-duty vehicle and light-duty truck travel fractions from model years n to n-19. To remain consistent with the data used in MOBILE3, travel fractions are assumed to be identical for gas and diesel light-duty vehicles; but separate travel fractions are used to characterize gasoline versus diesel light-duty trucks I and light-duty trucks II.

### 2.2.1 Lead Emission Factors

Lead emission factors are calculated in the same manner as in the recent report entitled, Supplementary Guidelines for Lead Implementation Plans -- Updated Projections for Motor Vehicle Lead Emissions, hereinafter referred to as the "lead document."1/ These lead emission estimates are multipled by a factor of 1.557 to account for the halogens, typically bromine and chlorine, which combine with lead to form total lead salt particulate emissions. This factor was obtained from a report by the Ethyl Corporation entitled Composition, Size, and Control of Automotive Exhaust Particulates, and is the ratio of PbClBr mass to Pb mass based on FTP results of 16 test vehicles.22/

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LDV (Pre-1971) and LDT (Pre-1971): Leaded Fuel

For $i=1,2,3$ $j=n-19,\ldots,1970$ $k=1$ $C_s$=from Table 2-7 $a_{s1,j}=(0.75)$:

$$EF_{i,j,k_1,n,L} = \left[ Pb_{L,n}(0.887)(M_L) + Pb_{NL,n}(0.113)(M_{NL,NC}) \right] \frac{(0.75)(1.557)}{(E_{c,i,j})(C_s)} \tag{2-3a}$$

presented for light-duty diesel vehicles and light-duty diesel trucks. The fractions of light-duty vehicles and light-duty trucks by model year which operate on leaded or unleaded gasoline or diesel fuel are presented in Tables 2-4, 2-9, and 2-12. Tables 2-5, 2-10, 2-13, and 2-14 contain information on light-duty vehicle and light-duty truck travel fractions from model years n to n-19. To remain consistent with the data used in MOBILE3, travel fractions are assumed to be identical for gas and diesel light-duty vehicles; but separate travel fractions are used to characterize gasoline versus diesel light-duty trucks I and light-duty trucks II.

### 2.2.1 Lead Emission Factors

Lead emission factors are calculated in the same manner as in the recent report entitled, Supplementary Guidelines for Lead Implementation Plans -- Updated Projections for Motor Vehicle Lead Emissions, hereinafter referred to as the "lead document."[1/] These lead emission estimates are multipled by a factor of 1.557 to account for the halogens, typically bromine and chlorine, which combine with lead to form total lead salt particulate emissions. This factor was obtained from a report by the Ethyl Corporation entitled Composition, Size, and Control of Automotive Exhaust Particulates, and is the ratio of PbClBr mass to Pb mass based on FTP results of 16 test vehicles.[22/]

#### LDV (Pre-1971) and LDT (Pre-1971): Leaded Fuel

For $i=1,2,3$ $j=n-19,...,1970$ $k=1$ $C_s$=from Table 2-7 $a_{s1,j}=(0.75)$:

$$EF_{i,j,k_1,n,L} = \Big[ Pb_{L,n}(0.887)(M_L) + Pb_{NL,n}(0.113)(M_{NL,NC}) \Big] \frac{(0.75)(1.557)}{(E_{c,i,j})(C_s)} \qquad (2\text{-}3a)$$

where $a_s$ = fraction of lead burned that is exhausted; for all non-catalyst vehicles and for catalyst vehicles using unleaded gasoline $a_{s1,j}$ = 0.75 (i.e., 75 percent); for catalyst vehicles using unleaded gasoline in 1975-1980, $a_{s2,j}$ = 0.40; for catalyst vehicles using leaded gasoline in 1981 and later, $a_{s2,j}$ = 0.44 (see Table 2-22)

$C_s$ = speed-dependent fuel economy correction factor based on steady cruise or cyclic driving; available from Table 2-7 (nondimensional)

$Pb_{NL,n}$ = lead content of unleaded gasoline in calendar year n from Table 2-2 (g/gal)

$Pb_{L,n}$ = average lead content of leaded gasoline in calendar year n from Table 2-2 (g/gal)

$E_{c,i,j}$ = city/highway combined on-road fuel economy for model year j and vehicle class i from Table 2-6 (miles/gallon)

$M_L$ = fraction of particles less than a user specifie size cutoff (0.1-10μ) that are emitted from vehicles that are fueled with leaded gasoline, from Table 2-20 or Figure 2-1

$M_{NL,C}$ = fraction of particles less than a user specified size cutoff (0.1-10μ) that are emitted from catalyst vehicles that are fueled with unleaded gasoline, from Table 2-20 or Figure 2-2

$M_{NL,NC}$ = fraction of particles less than a user specified size cutoff (0.1-10μ) that are emitted from non-catalyst vehicles that are fueled with unleaded gasoline, from Table 2-19 or Figure 2-2

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LDV (MY 1971-1974) and LDT (MY 1971-1978): Leaded Fuel

For i=1,2 j=1971,...,1974 k=1 $C_s$=from Table 2-7 $a_{s1,j}$=0.75:
and For i = 3 j=1971,...,1978

$$EF_{i,j,k,n,L} = \Big[Pb_{L,n}(.916)(ML) + Pb_{NL,n}(0.084)(M_{NL,NC})\Big] \frac{(0.75)(1.557)}{(E_{c,i,m})(C_s)} \qquad (2\text{-}3b)$$

---

## LDV (MY 1975+) and LDT (MY 1979+): Leaded Fuel

For $i=1,2$ $j=1975,\ldots,n$ $k=1$ $C_s=$from Table 2-7 $a_{s1,j}=0.75$:
and For $i=3$ $j=1979,\ldots,n$

$$EF_{i,j,k_1 n,L} = \Big[Pb_{L,n}(0.724)(M_L) + Pb_{NL,n}(0.276)(M_{NL,NC})\Big] \frac{(a_{s1,j})(1.5557)}{(E_{c,i,j})(C_s)} \qquad (2\text{-}4)$$

---

## LDV (MY 1975+) and LDT (MY 1975+): Unleaded Fuel

For $i=1,2,3$ $j=1975,\ldots,n$ $k=1$ $C_s=$from Table 2-7 $a_s=$from Table 2-22:

$$\begin{aligned} EF_{i,j,k_1,n,NL} = \Big[&(Pb_{NL,n})(1-r_i)(M_{NL,C})(a_{s1,j}) + \\ &\Big(Pb_{L,n}(r_i)(M_L)(F_{i,j,NL,NOCAT}) + \\ &P_i(F_{i,j,NL,CAT})(a_{s1,j})\Big) + \\ &Pb_{L,n}(r_i)(M_L)(1-P_i)(F_{i,j,NL,CAT})(a_{s,2,j})\Big] \frac{1.557}{E_{c,i,j}(C_s)} \end{aligned} \qquad (2\text{-}5)$$

where $r_i$ = misfueling rate for vehicle class i from Table 2-19

$P_i$ = fraction of catalyst equipped vehicles with catalysts removed from Table 2-23

The calculation of area lead particulate emissions necessitates the determination of the percentage of burned lead exhausted ($a_s$). A value for $a_s$ of 0.75 (i.e., 75 percent of the lead burned is exhausted) should be used for non-catalyst equipped, gasoline-powered vehicles. The 0.75 value is based on tests which measured exhaust emissions under cyclic driving conditions and found that 17 percent of the lead is retained by the engine (in the oil and combustion chamber) and 8 percent is retained by the muffler and exhaust pipes.31/ For gasoline powered vehicles equipped with catalysts, a value of $a_s=0.40$ for 1975 to 1980 and $a_s=0.44$

for 1981 and later model year vehicles that have been misfueled, should be used. (For properly fueled catalyst vehicles the values of $a_s$ for all model years is 0.75.) The value of $a_s$ was computed from lead retention of monolithic and pelleted catalysts, respectively, and weighted for the sales mix of these catalysts in each time frame. The values of $a_s$ are not assumed to vary with speed, since $a_s$ is more correlated with driving mode, e.g., acceleration, cruise or deceleration, rather than speed alone, and little data is available to make $a_s$ sensitive to all of these variables.

Combined city/highway fuel economy ($E_{c,i,j}$) is yet another factor affecting area lead particulate emissions. Fuel economy versus model year is provided in Table 2-6.

Lead particulate emissions can be determined at any speed by using Equations (2-3), (2-4), and (2-5) (for light-duty vehicles and trucks) and the appropriate value of the speed dependent fuel economy correction factor ($C_s$) for the vehicle speed of interest. Values of $C_s$ at various speeds are provided in Table 2-7. It should be noted that average vehicle speed and $C_s$ can be determined for an area by either of two approaches. One approach is to base $C_s$ on the average vehicle speed for the area of concern. The average area vehicle speed should be a weighted average based on average speeds and VMT data for the various roadway classifications, such as limited access (greater than 5 mph), suburban roads (35 mph) and urban streets (25 mph or less). The other approach, which is considered more accurate, is to determine $C_s$ and area emissions separately for each roadway classification (and average speed).

Area lead particulate emissions also are dependent upon the lead content of gasoline in a given calendar year. Values for the lead content of leaded ($Pb_{L,n}$) and unleaded gasoline ($Pb_{NL,n}$) are contained in Table 2-2. Values for future years will be updated as new information becomes available.

### 2.2.1.1 Misfueling and Fuel Switching

EPA has observed that misfueling rates (i.e., percentage of vehicles designed for use on unleaded gasoline that use leaded gasoline) are dependent on vehicle mileage and increase with vehicle mileage accumulation. Strictly speaking, this dependence on mileage should be reflected in the calculation of particulate emissions, with each model year receiving its own misfueling rate. However, this further complicates an already complex calculation. To give the user a choice, this report offers both the option of using a single average misfueling rate for all model years of a given vehicle class and exact misfueling rates for each vehicle class by vehicle age. The single average rates are determined for the weighted average mileage accumulated for each vehicle class and are listed in Table 2-19 for inspection and maintenance (I/M) and non-I/M areas. In other words, in the calculation of emission factors from 1975 on, the misfueling rate ($r_i$) depends only on which vehicle class (i) is being considered and whether the area of interest has an I/M program. As a result, misfueling rates and particulate emissions will be slightly overestimated, with the degree of overestimation declining with later evaluation years and essentially disappearing in 1995. For users who desire more accuracy, Table 2-19a gives exact misfueling rates for different vehicle ages and classes affected by misfueling.

The use of leaded gasoline on vehicles designed for unleaded fuel results in lead salt emissions. Since most of these vehicles have catalysts, the lead results in poisoning of the catalyst so that organic particulate emissions can be assumed to increase to the levels found with non-catalyst vehicles. Also, catalyst poisoning should result in no sulfur dioxide oxidation to sulfates. Sulfate levels are therefore assumed to be the same as those from non-catalyst vehicles.

Discretionary fuel switching (i.e., percentage of vehicles designed for use on leaded gasoline that use unleaded gasoline) is assumed to equal 11.3 percent of the leaded fleet prior to 1971, and 8.4 percent from 1971 to 1974 for the LDV and LDT I categories. The discretionary rate for the LDT II class is 8.4 percent from 1971 to 1978, and 27.6 percent thereafter. For the LDV and LDT1 classes, discretionary switching is assumed to be 27.6 percent after 1974. These discretionary rates apply only to the lead salt component of light-duty vehicle and light-duty truck I and II emissions. The misfueling rates employed here were used in the December 1983 EPA report, Anti-Tampering and Anti-Misfueling Programs to Reduce In-Use Emissions from Motor Vehicles, EPA-AA-TSS-83-10.[3/] The discretionary fuel switching rates were obtained from Energy and Environmental Analysis, Inc., Assessment of Current and Projected Trends in Light-Duty Vehicle Fuel Switching, June 1984.[7/]

### 2.2.2 Organic and Sulfate Emission Factors

#### 2.2.2.1 Control System Fractions

Organic and sulfate emissions of gasoline-fueled vehicles depend on the type of vehicle emission control system in addition to the vehicle model year. The fraction of vehicles with different emission control systems to which different emission factors are applied are handled similarly to the fleet sales fractions for leaded, unleaded and diesel vehicles versus model year. The main difference is that these are fractions of the total number of vehicles designed for use of unleaded fuel and not the total number of vehicles in each vehicle class. These fractions are listed in Tables 2-3, 2-8, and 2-11 for light-duty vehicles and light-duty trucks I and II, respectively. These vehicle classes have a relatively wide range of control technology and, as a result, have a wide range of emission factor estimates. It should be noted that a small number of non-catalyst equipped vehicles have been certified for use on unleaded gasoline since 1975. These vehicles constitute a very small percentage of the total non-catalyst fleet, but are nonetheless considered in this report and have been given their own control system fraction category ($F_{i,j,NL,NOCAT}$).

The light-duty vehicle and truck emission control system fractions were obtained from the "sales-weighted" EPA emission factor in-use vehicle test data base. This data base contains gasoline-fueled vehicle mixes approximating the sales mixes for the 1975 through 1982 model years. All vehicles and trucks prior to 1975 models are assumed to be designed for use on leaded fuel (i.e., no diesel or catalyst vehicles). Emission control system fractions for 1983 and later LDVs are determined from recent projections by Energy and Environmental Analysis, Inc. in a report entitled, Forecasts of Emission Control Technology 1983-1990.[38/]

Data for 1975 through 1978 light-duty truck I technology fractions were obtained by combining EPA fuel economy data base sales figures by engine displacement and model type and Federal Certification Test Results for these years from the Federal Register, Volume 40, No. 48, March 11, 1975;[9/] Volume 41, No. 46, March 8, 1976;[10/] Volume 42, No. 110, June 8, 1977;[11/] and Volume 43, No. 181, September 18, 1978.[12/] The certification data provided emission control systems by model type and engine displacement which were matched with fuel economy sales fractions. These two data sources also served as the basis for deriving the 1979-1981 light-duty truck technology fractions.

Data for 1982 through 1984 light-duty trucks I and II technology fractions were obtained by subtracting California sales figures by engine family from Federal sales figures given in the EPA Certification data base for those years. Forecasts of post-1984 light-duty truck I and II technology fractions were developed internally and are consistent with data used for EPA emission factor projections.

### 2.2.2.2 Organic and Sulfate Emission Factor Components

Organic and sulfate emission factors for light-duty vehicles and light-duty trucks vary by model year, control system, vehicle speed and fuel type (leaded versus unleaded). These emission factors are derived from emission test data and are listed in Table 2-1 in terms of grams per mile. This table of emission factors is used in the following sets of equations to calculate LDV and LDT organic and sulfate emission factor components. (Table 2-1 also refers the user to the proper equation(s) listed below to which each emission factor should be applied.)

#### Organic Emission Factor Components

LDV and LDT (Pre-1970): Leaded Fuel, Avg. Speed = All

For $i=1,2,3 \quad j=n-19,\ldots,1969 \quad k=2$:

$$EF_{i,j,k_2,L} = 0.193\ M_L \text{ (g/mile)} \tag{2-6}$$

---

LDV AND LDT (1971-1974): Leaded Fuel, Avg. Speed = All

For $i=1,2,3 \quad j=1970,\ldots,1974 \quad k=2$:

$$EF_{i,j,k_2,L} = 0.068\ M_L \text{ (g/mile)} \tag{2-7}$$

---

LDV and LDT (1975+): Leaded Fuel, Avg. Speed = All

$$EF_{i,j,k_2,L} = 0.030\ M_L \text{ (g/mile)} \tag{2-8}$$

---

### LDV and LDT (1975+): Unleaded Fuel, Avg. Speed = All

$$EF_{i,j,k_2,NL} = (1-r_i)(F_{i,j,CAT})(0.017)(M_{NL,C}) \quad (2\text{-}9)$$

$$+ (r_i)(F_{i,j,CAT})(0.068)(M_L) + (F_{i,j,NL,NOCAT})(0.030)(M_{NL,NC})$$

where $F_{i,j,CAT}$ = fraction of the unleaded vehicle class i fleet equipped with a catalyst in model year j

$F_{i,j,NL,NOCAT}$ = fraction of the unleaded vehicle class i fleet without a catalyst in model year j

---

## Sulfate Emission Factor Components

### LDV and LDT (All Model Years): Leaded Fuel, Avg. Speed = 19.6 mph

For $i=1,2,3 \quad j=n-19,\ldots,n \quad k=3 \quad s=19.6$:

$$EF_{i,j,k_3,L} = 0.002\ M_L\ (\text{g/mile}) \quad (2\text{-}10)$$

---

### LDV and LDT (All Model Years): Leaded Fuel, Avg. Speed = 34.8 mph

For $i=1,2,3 \quad j=n-19,\ldots,n \quad k=3 \quad s=34.8$

$$EF_{i,j,k_3,L} = 0.001\ M_L\ (\text{g/mile}) \quad (2\text{-}11)$$

---

### LDV and LDT (1975+): Unleaded Fuel, Avg. Speed = 19.6

For $i=1,2,3 \quad j=1975,\ldots,n \quad k=3 \quad s=19.6$

$$EF_{i,j,k_3,NL} = (1-r_i)\Big[(F_{i,j,CAT/NOAIR})(0.005)(M_{NL,C}) \qquad (2\text{-}12)$$

$$+ (F_{i,j,CAT/AIR})(0.016)(M_{NL,C})$$

$$+ (F_{i,j,NL,NOCAT})(0.002)(M_{NL,NC})\Big]$$

$$+ (r_i)(0.002)(M_L)$$

where $F_{i,j,CAT/NOAIR}$ = fraction of the unleaded vehicle class i fleet equipped with a catalyst but no air pump in model year j; this includes oxidation catalyst $(F_{i,j,OXCAT})$ and three way catalyst $(F_{i,j,3WCAT})$ vehicles with no air pump

$F_{i,j,CAT/AIR}$ = fraction of the unleaded vehicle class i fleet equipped with a catalyst and an air pump in model year j; this includes oxidation catalyst $(F_{i,j,OCAT/AIR})$ and three-way plus oxidation catalyst $(F_{i,j,3WCAT/OXCAT})$ vehicles with air pumps

---

### LDV and LDT (1975+): Unleaded Fuel Avg. Speed = 34.8 mph

For $i=1,2,3 \quad j=1975,\ldots,n \quad k=3 \quad s=34.8 \quad r_i$ = from Table 2-19:

$$EF_{i,j,k_3NL} = (1-r_i)\Big[(F_{i,j,NL,NOCAT})(0.001)(M_{NL,NC}) \qquad (2\text{-}13)$$

$$+ (F_{i,j,OXCAT})(0.005)(M_{NL,C}) + (F_{i,j,3WCAT})(0.001)(M_{NL,C})$$

$$+ (F_{i,j,OXCAT/AIR})(0.020)(M_{NL,C}) + (F_{i,j,3WCAT/OXCAT})$$

$$(0.025)(M_{NL,C})\Big] + (r_i)(0.001)(M_L)$$

where $F_{i,j,OXCAT}$ = fraction of the unleaded vehicle class i equpped with an oxidation catalyst but no air pump in model year j

$F_{i,j,3WCAT}$ = fraction of the unleaded vehicle class i equipped with a three-way catalyst in model year j; note these vehicles are sometimes equipped with air pumps that are usually only used during vehicle start-up; therefore, the vehicle category as a whole is assumed to emit sulfates at the same rate as non-air pump-equipped vehicles for emission factor consideration

$F_{i,j,OXCAT/AIR}$ = fraction of the unleaded vehicle class i equipped with an oxidation catalyst and an air pump in model year j

### 2.2.3 Diesel Emission Factors (Light-Duty)

Diesel particulate emission factors for different model years are listed separately for light-duty vehicles and light-duty trucks in Table 2-1. These emission factors are derived from test data and are used in the equations below to calculate total diesel particulate emission factor components for LDVs and LDTs. (Table 2-1 also refers the user to the proper equation below to which each emission factor should be applied.)

LDV (Pre-1981): Diesel Fuel

For $i=1 \quad j=n-19,\ldots,1980$:

$$EF_{i,j,D} = 0.700\ M_D \text{ (g/mile)} \tag{2-14}$$

where $M_D$ = fraction of particles less than a user-specified size cutoff (0.1-10 μ) that are emitted from vehicles that are fueled with diesel fuel, from Table 2-20 or Figure 2-3

---

LDV (1981-1986): Diesel Fuel

For $i=1 \quad j=1981,\ldots,1986$:

$$EF_{i,j,D} = 0.300\ M_D \text{ (g/mile)} \tag{2-15}$$

LDV (1987+): Diesel Fuel

For i=1 j=1987,...,n:

$$EF_{i,j,D} = 0.200\ M_D \text{ (g/mile)} \qquad (2\text{-}16)$$

---

LDT (Pre-1981): Diesel Fuel

For i=1,2,3 j=n-19,...,1980:

$$EF_{i,j,D} = 0.800\ M_D \text{ (g/mile)} \qquad (2\text{-}17)$$

---

LDT (1981-1986): Diesel Fuel

For i=1,2,3 j=1981,...,1986:

$$EF_{i,j,D} = 0.300\ M_D \text{ (g/mile)} \qquad (2\text{-}18)$$

---

LDT (1987+): Diesel Fuel

For i=2,3 j=1987,...,n:

$$EF_{i,j,D} = 0.260\ M_D \text{ (g/mile)} \qquad (2\text{-}19)$$

## 2.3 HEAVY-DUTY VEHICLES

This section presents the lead, sulfate and organic emission factor component equations for gasoline-fueled heavy-duty vehicles. Composite particulate emission factor components for heavy-duty diesel vehicles also are provided. These emission factor components are then used in conjunction with estimates of sales fractions of heavy-duty vehicles by model year and fuel type (Table 2-15) and travel fractions by vintage (Tables 2-16 and 2-17) to calculate total emission factors. As shown in Table 2-15, heavy-duty gasoline vehicles use leaded gasoline prior to 1987. The fraction of unleaded vehicles from 1987 on represents the

8,501-14,000 lbs percentage of heavy-duty gasoline vehicles, and is based on the assumption that the more stringent emission standards currently proposed for 1987 and later heavy-duty gasoline vehicles in the 8,501 to 14,000 lbs range will require the use of oxidation catalysts and air injection. Heavy-duty gasoline vehicles above 14,000 lbs are assumed to consist entirely of leaded gasoline vehicles for all model years. The reader also should note that the travel fractions for heavy-duty diesel trucks in Table 2-17 are specific to calendar year 1987 and are therefore presented for example only. These fractions shift from one calendar year to the next due to the increasing penetration of diesels in the lower mileage, lighter weight categories of heavy-duty trucks (which consists of all vehicles over 8,500 lbs. GVW). To calculate heavy-duty diesel travel fractions in a particular year of interest other than 1987, the reader needs to use the projections of diesel heavy-duty vehicles in-use by GVW category and the estimates of diesel heavy-duty vehicle mileage accumulation by GVW category which are contained in Appendix A.

Table 2-6 presents data on heavy-duty truck fuel economy. Estimates of misfueling for heavy-duty gas vehicles under 14,000 lbs GVW (after model year 1986) are contained in Tables 2-19 and 2-19a. The effect of discretionary fuel switching has not been incorporated in the heavy-duty vehicle emission factor equations due to the lack of data on the current fuel purchase behavior of owners of heavy-duty vehicles. However, as new data become available these equations will be revised accordingly.

### 2.3.1 Lead Emission Factor Components

The following equations are used to derive lead emission factor components for heavy-duty gas vehicles operated on leaded and unleaded gasoline:

### HDGV (Pre-1987): Leaded Fuel

For $i=4$ $j=n-19,\ldots,1986$ $k=1$ $a_s$ = from Table 2-22:

$$EF_{i,j,k_1n,L} = \frac{(a_{s1,j})(Pb_{L,n})(1.557)}{E_{c,4,j}} (M_L) \qquad (2\text{-}20)$$

### HDGV (1987+): Unleaded Fuel

For $i=4$ $j=1987,\ldots,n$ $k=1$ $a_s$ = from Table 2-2 $r_4$ = from Table 2-19:

$$EF_{i,j,k_1,n,NL} = \frac{(1-r_4)(a_{s1,j})(Pb_{NL,n})(1.557)}{(E_{c,4a,j})^{*}} (M_{NL,C}) \qquad (2\text{-}21)$$

$$+ \frac{(r_4)(a_{s2,j})(Pb_{L,n})(1.557)}{E_{c,4a,j}} (M_L)$$

### HDGV (1987+): Leaded Fuel

For $i=4$ $j=1987,\ldots,n$ $k=1$ $a_s$ = from Table 2-22:

$$EF_{i,j,k_1,n,L} = \frac{(a_{s1,j})(Pb_{L,n})(1.557)}{(E_{c,4b,j})^{**}} (M_L) \qquad (2\text{-}22)$$

---

*4a represents the fuel economy for HDGV1 after 1986.

**4b represents the fuel economy for HDGV2 after 1986.

## 2.3.2 Organic Emission Factor Components

Organic emission factors for heavy-duty gasoline vehicles are listed in Table 2-1 in g/mile. These factors are used in the equations below to calculate the total HDG organic emission factor component. The reader should note that the HDG organic emission factors listed in Table 2-1 were derived assuming a constant 5.0 mpg for HDG vehicles of all model years. Therefore, the equations below have been adjusted by the factor $(5.0/E_{c,4,j})$ to account for the HDG fuel economy values currently used in MOBILE3.

#### HDGV (Pre-1987): Leaded Fuel

For $i=4$ $j=n-19,\ldots,1986$ $k=2$:

$$EF_{i,j,k_2,L} = 0.370\ (M_L)\ \left(\frac{5.0}{E_{c,4,j}}\right) \tag{2-23}$$

#### HDGV (1987+): Unleaded Fuel

For $i=4$ $j=1987,\ldots,n$ $k=2$ $r_4$ = from Table 2-19:

$$EF_{i,j,k_2,NL} = \left[(1-r_4)(0.054)(M_{NL,C}) + (r_4)(0.163)(M_L)\right] \left(\frac{5.0}{E_{c,4a,j}}\right) \tag{2-24}$$

#### HDGV (1987+): Leaded Fuel

For $i=4$ $j=1987,\ldots,n$ $k=2$:

$$EF_{i,j,k_2,L} = 0.370\ (M_L)\ \left(\frac{5.0}{E_{c,4b,j}}\right) \tag{2-25}$$

### 2.3.3 Sulfate Emission Factor Components

Sulfate emission factors for HDG vehicles also are listed in Table 2-1 and are used in the following equations to produce HDG sulfate emission factor components. As with the HDG organic emisison factor components, the equations below contain the adjustment factor ($5.0/E_{c,4,j}$) to reflect the HDG fuel economy values currently used in MOBILE3.

#### HDGV (Pre-1987): Leaded Fuel

For $i=4$ $j=n-19,\ldots,1986$ $k=3$:

$$EF_{i,j,k_3,L} = 0.006\ (M_L)\ \left(\frac{5.0}{E_{c,4,j}}\right) \tag{2-26}$$

#### HDGV (1987+): Unleaded Fuel

For $i=4$ $j=1987,\ldots,n$ $k=3$ $r_4$ = from Table 2-19:

$$EF_{i,j,k_3,L}\ \left[(1-r_4)(0.048)\ (M_{NL,C}) + (r_4)(0.006)(M_L)\right] \left(\frac{5.0}{E_{c,4a,j}}\right) \tag{2-27}$$

HDGV (1987+): Leaded Fuel

For $i=4 \quad j=1987,\ldots,n \quad k=3$:

$$EF_{i,j,k_3,L} = 0.006\ (M_L)\ \left(\frac{5.0}{E_{c,4b,j}}\right) \tag{2-28}$$

### 2.3.4 Diesel Particulate Emission Factors

Diesel particulate emission factors (measured in g/mile) for heavy-duty diesel vehicles are derived with the following equations:

HDDV (All Model Years): Diesel Fuel

For $i=5 \quad j=n-19,\ldots,n$:

$$EF_{5,j,D} = 0.7\ M_D\ (CF_{D,j}) \tag{2-29}$$

where $CF_{D,j}$ = factor for converting gm/bhp-hr to gm/mi, from Table 2-21

## 2.4 MOTORCYCLE EMISSION FACTORS

This section presents the emission factors for motorcycles. Table 2-18 contains travel fractions for the motor vehicle fleet. Motorcycle sales are assumed to consist entirely of leaded gasoline vehicles for all model years. Therefore, misfueling rates for motorcycles are zero. Discretionary fuel switching rates are not incorporated into the equations due to the lack of data on the fuel purchasing habits of motorcycle owners

Motorcycle fractions are based on 2-stroke versus 4-stroke emission factor estimates (see Table 2-1). Before 1978, most on-road motorcycle travel was done by 2-stroke vehicles (53.4 percent) and slightly less (46.6 percent) by 4-stroke vehicles according to sales figures in the 1983 Motorcycle Statistical Annual published by the Motorcycle Industry

Council, Inc.[13/] In 1978, more stringent control of motorcycle emissions caused nearly all motorcycle manufacturers to build 4-stroke vehicles for on-road usage. Therefore, it is assumed that all motorcycles from 1978 on are 4-stroke vehicles since nearly all 2-stroke mileage is accumulated off-road.

The equations below present the lead emission factor component calculations for motorcycles. Due to the absence of catalyst emission controls on motorcycles, organic and sulfate emission factor components are not calculated.

MC (Pre-1978): Leaded Fuel

For i=6 j=n-19,...,1977:

$$EF_{6,j,L} = \left[(0.466)(0.046) + (0.534)(0.330)\right] (M_L) \qquad (2\text{-}30)$$

$$= 0.198\ M_L \text{ (g/mile)}$$

---

MC (1978+): Leaded Fuel

For i=6 j=1978,...,n:

$$EF_{6,j,L} = 0.046\ M_L \text{ (g/mile)} \qquad (2\text{-}31)$$

## 2.5 BRAKE AND TIRE WEAR PARTICULATE EMISSION FACTOR COMPONENTS

Additional sources of motor vehicle particulate emissions include brake and tire wear emission components. Limited testing has been performed to estimate the contributions of brake and tire wear emissions to the total light-duty vehicle particulate emission rate. No data exist on the rate at which light-duty trucks, heavy-duty vehicles, or motorcycles emit brake and tire wear emissions. The user should be aware that brake and tire wear particulates are emitted from these vehicle classes at different rates than the light-duty vehicle rate, but since no data exists, the light-duty vehicle rate is used to estimate their contribution to total particulate emission rates.

Brake wear emissions from light-duty vehicles have been measured in a recent study and have been found to consist of significant quantities of particulate in the airborne particle size range. Airborne particulate emission rates for brake wear particles as measured on braking cycles representative of urban driving averaged 0.0128 grams per mile for light-duty gasoline vehicles.[40/] Particle size distribution for brake wear particulate ($M_B$) is included in this reference and is summarized in Table 2-20. The rate of 0.0128 g/mile times the appropriate fraction of $M_B$ for the particle size cutoff of interest should be added to any calculation of particulate emissions less than 10 microns for all classes of vehicles. In the example calculation in Section 3-0 of this report, for example, $M_B = 0.98$, the brake wear particulate emission rate is therefore 0.0125 g/mile and the total light-duty vehicle particulate emission rate is 0.0726 g/mile. In this particular example, therefore, brake wear emissions account for 17 percent of the total particulate emission rate.

Tire wear particulate is generally larger in size than brake wear particulate and therefore consists of fewer particles in the airborne size range. Emission rates for airborne tire wear particulate for light-duty vehicles has been estimated at 0.002 g/mile.[41/] [42/] This rate should be added to calculations of particulate emissions less than 10 microns for all classes of vehicles. The addition of 0.002 g/mile in the example calculation in Section 3-0 indicates that airborne tire wear particulate accounts for about 3 percent of the total light-duty particulate emission rate.

No data on airborne particle size distribution are available for analyses of tire wear particulate emission rates at smaller particle size cutoffs (i.e., 2.5 microns or 7 microns). The user should either interpolate between zero and 10 microns to determine the appropriate emission rate for the distribution of tire wear particles below the desired size cutoff (e.g., at 7 microns tire wear emissions = 0.0014 g/mile and at 2.5 microns tire wear emissions = 0.0005 g/mile) or simply neglect tire wear particulate since it is likely to be negligible in these smaller particle size ranges.

Another source of particulate emissions for which emission factors could be developed is reentrained particulate from particles that have been deposited on road surfaces or possibly road material itself. While information is available on these reentrained particulates,[46/ 47/] they are not considered to be directly emitted by mobile sources and therefore are not included in this report.

TABLE 2-1

EMISSION FACTORS OF MOTOR VEHICLE ENGINE TOTAL PARTICULATE EMISSIONS

| Applicable Model Year(s) | Particulate Component | Control System | Type of Fuel Used | Vehicle Speed (MPH) | Emission Factor (grams/mile) | Equation Used In | Emission Factor Source Reference Number |
|---|---|---|---|---|---|---|---|
| Light-Duty Gasoline Vehicles and Trucks: | | | | | | | |
| Pre-1970 | Organic | NOCAT | Leaded | All | 0.193 | (2-6) | 8 |
| 1970-1974 | Organic | NOCAT | Leaded | All | 0.068 | (2-7) | 8 |
| 1975+ | Organic | NOCAT | Leaded | All | 0.030 | (2-8) | 8(a) |
| 1975+ | Organic | CAT | Unleaded | All | 0.017 | (2-9) | 8(b) |
| 1975+ | Organic | CAT | Leaded | All | 0.068 | (2-9) | 8(c) |
| 1975+ | Organic | NOCAT | Unleaded | All | 0.030 | (2-9) | 8(a)(h) |
| All | Sulfate | NOCAT | Leaded | 19.6 | 0.002 | (2-10)(2-12) | 8 |
| 1975+ | Sulfate | CAT | Leaded | 19.6 | 0.002 | (2-12) | 8(d) |
| Pre-1975 | Sulfate | NOCAT | Leaded | 34.8 | 0.001 | (2-11) | 2 |
| 1975+ | Sulfate | CAT/NOAIR(f) | Unleaded | 19.6 | 0.005 | (2-12) | 8 |
| 1975+ | Sulfate | CAT/AIR(g) | Unleaded | 19.6 | 0.016 | (2-12) | 8 |
| 1975+ | Sulfate | NOCAT | Unleaded | 19.6 | 0.002 | (2-12) | 8(e) |
| 1975+ | Sulfate | NOCAT | Leaded | 34.8 | 0.001 | (2-11) | 2 |
| 1975+ | Sulfate | NOCAT | Unleaded | 34.8 | 0.001 | (2-13) | 2 |
| 1975+ | Sulfate | OXCAT/NOAIR | Unleaded | 34.8 | 0.005 | (2-13) | 2 |
| 1975+ | Sulfate | 3WCAT | Unleaded | 34.8 | 0.001 | (2-13) | 2 |
| 1975+ | Sulfate | OXCAT/AIR | Unleaded | 34.8 | 0.020 | (2-13) | 2 |
| 1975+ | Sulfate | 3WCAT/AIR | Unleaded | 34.8 | 0.025 | (2-13) | 2 |
| 1975+ | Sulfate | CAT | Leaded | 34.8 | 0.001 | (2-13) | 2(d) |
| Light-Duty Diesel Vehicles and Trucks: | | | | | | | |
| Pre-1981 | All LDDV | - | Diesel | All | 0.700 | (2-14) | 4 |
| 1981-1986 | All LDDV | - | Diesel | All | 0.300 | (2-15) | 4 |
| 1987+ | All LDDV | - | Diesel | All | 0.200 | (2-16) | 4 |
| Pre-1981 | All LDDV | - | Diesel | All | 0.800 | (2-17) | 4 |
| 1981-1986 | All LDDV | - | Diesel | All | 0.300 | (2-18) | 4 |
| 1987+ | All LDDV | - | Diesel | All | 0.260 | (2-19) | 4 |

TABLE 2-1 (cont'd)

EMISSION FACTORS OF MOTOR VEHICLE ENGINE TOTAL PARTICULATE EMISSIONS

| Applicable Model Year(s) | Particulate Component | Control System | Type of Fuel Used | Vehicle Speed (MPH) | Emission Factor (grams/mile) | Equation Used In | Emission Factor Source Reference Number |
|---|---|---|---|---|---|---|---|
| Heavy-Duty Gasoline Trucks: | | | | | | | |
| Pre-1987 | Organic | NOCAT | Leaded | All | 0.370 | (2-23) | 8 |
| 1987+ | Organic | CAT/AIR | Unleaded | All | 0.054 | (2-24) | 8 |
| 1987+ | Organic | CAT/AIR | Leaded | All | 0.163 | (2-24) | (i) |
| 1987+ | Organic | NOCAT | Leaded | All | 0.370 | (2-25) | |
| Pre-1987 | Sulfate | NOCAT | Leaded | All | 0.006 | (2-26) | 8 |
| 1987+ | Sulfate | CAT/AIR | Unleaded | All | 0.048 | (2-27) | 8 |
| 1987+ | Sulfate | NOCAT | Leaded | All | 0.006 | (2-27) | 8 |
| Heavy-Duty Diesel Trucks: | | | | | | | |
| All | All HDDT@ | - | Diesel | All | 0.700* | (2-29) | 8 |
| Motorcycles: | | | | | | | |
| All | 4-Stroke | - | Leaded | All | 0.046 | (2-30)(2-31) | 2 |
| All | 2-Stroke | - | Leaded | All | 0.330 | (2-30) | 2 |

---

(a) Ratio 1.5/3.4 of 1970-74 organic value.

(b) Combined value of organic from catalyst/no air and catalyst/air vehicles.

(c) Same as 1970-74 no catalyst leaded organic value.

(d) Misfueled vehicles.

(e) Same as no catalyst leaded value.

(f) Includes oxidation catalyst vehicles and three-way catalyst vehicles without air pumpts.

(g) Includes oxidation catalyst vehicles and three-way plus oxidation catalyst vehicles with air pumps.

(h) Value should actually be higher for the light-duty truck II class (much like the 1970-74 organic value) but no data exist.

(i) Letter from Phil Lorang, July 12, 1984.

*g/Bhp-hr

## TABLE 2-2

## LEAD CONTENT OF GASOLINE

| Year | Leaded Gasoline* (g/gal) | Unleaded Gasoline (g/gal) |
|---|---|---|
| 1974 | 1.79 | 0.014 |
| 1975 | 1.82 | 0.014 |
| 1976 | 2.02 | 0.014 |
| 1977 | 2.03 | 0.014 |
| 1978 | 1.94 | 0.014 |
| 1979 | 1.85 | 0.014 |
| 1980 | 1.38 | 0.014 |
| 1981 | 1.15 | 0.014 |
| 1982 | 1.24 | 0.014 |
| 1983 | 1.14 | 0.014 |
| 1984 | 1.10 | 0.014 |
| 1985 | 0.50 | 0.014 |
| 1986 | 0.10 | 0.014 |
| 1987 | 0.10 | 0.014 |
| 1988 | 0.10 | 0.014 |
| 1989 | 0.10 | 0.014 |
| 1990 | 0.10 | 0.014 |

---

*1974-1982: Lead content based upon data submitted to EPA on historical sales data for leaded gasoline and data indicating the actual pooled average lead content. The value for unleaded gasoline is based on recent MVMA fuel surveys.

1983-1990: Lead content based upon requirements for average lead content of leaded gasoline. During the first half of 1983, small refineries were subject to a pooled average lead standard. Recent EPA regulations require refiners to reduce the lead content of leaded gasoline to 0.5 g/gal by July 31, 1985 and to 0.1 g/gal by January 1, 1986 and thereafter. (See Federal Register, Vol. 50, No. 45, March 7, 1985.)

TABLE 2-3

FRACTION OF LIGHT-DUTY VEHICLE MODEL YEAR SALES EQUIPPED WITH DIFFERENT EMISSION CONTROL SYSTEMS
(Low-Altitude Non-California)

| System | Pre-1975 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988+ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $F_{L,l,j}$ | 1.000 | .128 | .134 | .158 | .126 | .097 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $F_{l,j,NL,NOCAT}$ | 0 | .081 | .020 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $F_{l,j,OXCAT/NOAIR}$ | 0 | .597 | .637 | .650 | .650 | .640 | .421 | .033 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $F_{l,j,OXCAT/AIR}$ | 0 | .322 | .343 | .350 | .350 | .345 | .514 | .099 | .142 | .109 | 0 | 0 | 0 | 0 | 0 |
| $F_{l,j,3WCAT}$ | 0 | 0 | 0 | 0 | 0 | .015 | .053 | .263 | .313 | .244 | .396 | .532 | .587 | .641 | .704 |
| $F_{l,j,3WCAT/OXCAT}$ | 0 | 0 | 0 | 0 | 0 | 0 | .012 | .605 | .545 | .647 | .604 | .468 | .414 | .359 | .296 |
| $F_{D,l,j}$ | 0 | .003 | .003 | .004 | .009 | .028 | .034 | .061 | .046 | .053 | .060 | .066 | .073 | .080 | .090 |
| $F_{l,j,CAT}$ | 0 | .919 | .980 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| $F_{l,j,CAT/NOAIR}$ | 0 | .597 | .637 | .650 | .650 | .655 | .474 | .296 | .149 | .194 | .237 | .381 | .450 | .518 | .554 |
| $F_{l,CAT/AIR}$ | 0 | .322 | .343 | .350 | .350 | .345 | .526 | .704 | .851 | .806 | .763 | .691 | .587 | .482 | .446 |

SOURCES: U.S. EPA Emission Factor In-Use Test Vehicle Data Base.
EEA Forecasts of Emission Control Technology 1982-1990 (used for years 1982-1988+).
U.S. EPA Fuel Economy Data Base.

NOTES: Model year columns do not add up to 1.000. Only $F_{L,l,j}$ and $F_{D,l,j}$ are fractions of all LDVs. All other systems are fractions of all unleaded LDVs.

## TABLE 2-4

## FLEET SALES FRACTIONS
## Light-Duty Vehicles

| Model Years | Nonleaded Gasoline Fraction of LDV Fleet, $F_{NL,i,j}$* | Leaded Gasoline Fraction of LDV Fleet, $F_{L,i,j}$ | Diesel Fraction of LDV Fleet, $F_{D,i,j}$** |
|---|---|---|---|
| Pre-1975 | 0.000 | 1.000 | 0.000 |
| 1975 | 0.869 | 0.128 | 0.003 |
| 1976 | 0.863 | 0.134 | 0.003 |
| 1977 | 0.838 | 0.158 | 0.004 |
| 1978 | 0.865 | 0.126 | 0.009 |
| 1979 | 0.875 | 0.097 | 0.028 |
| 1980 | 0.966 | 0.000 | 0.034 |
| 1981 | 0.939 | 0.000 | 0.061 |
| 1982 | 0.954 | 0.000 | 0.046 |
| 1983 | 0.947 | 0.000 | 0.053 |
| 1984 | 0.940 | 0.000 | 0.060 |
| 1985 | 0.934 | 0.000 | 0.066 |
| 1986 | 0.927 | 0.000 | 0.073 |
| 1987 | 0.920 | 0.000 | 0.080 |
| 1988 | 0.910 | 0.000 | 0.090 |
| 1989 | 0.900 | 0.000 | 0.100 |
| 1990 | 0.887 | 0.000 | 0.113 |
| 1991 | 0.887 | 0.000 | 0.113 |
| 1992 | 0.886 | 0.000 | 0.114 |
| 1993 | 0.886 | 0.000 | 0.114 |
| 1994 | 0.885 | 0.000 | 0.115 |
| 1995+ | 0.885 | 0.000 | 0.115 |

Where $F_{NL,i}$ = Estimated fraction of the LDV model year fleet which use nonleaded gasoline

$F_{L,i}$ = Estimated fraction of the LDV model year fleet which use leaded gasoline

$F_{D,i}$ = Estimated fraction of the LDV model year fleet which use diesel fuel

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*Percentages of gasoline vehicles requiring leaded and nonleaded fuel obtained from Energy and Environmental Analysis, Inc., "The Highway Fuel Consumption Model: Tenth Quarterly Report," November 1983.

**Diesel and gasoline sales projections were made by EPA based on data obtained from Energy and Environmental Analysis, Inc., "The Highway Fuel Consumption Model: Tenth Quarterly Report," November 1983.

## TABLE 2-5

## TRAVEL WEIGHTING FACTOR CALCULATION*
### Light-Duty Vehicles

| Vehicle Age | (a) January 1 Fraction Total Registration | (b) Annual Mileage Accumulation Rate | (a)(b) | [(a)(b)/(SUM)] Fraction of LDV Travel by Model Year $m_{1,j,G}$ and $m_{1,j,D}$** |
|---|---|---|---|---|
| 1 | 0.028 | 12,818 | 358.9 | 0.038 |
| 2 | 0.107 | 12,639 | 1,352.4 | 0.142 |
| 3 | 0.100 | 11,933 | 1,193.3 | 0.125 |
| 4 | 0.094 | 11,268 | 1,059.2 | 0.111 |
| 5 | 0.088 | 10,639 | 936.2 | 0.098 |
| 6 | 0.080 | 10,045 | 803.6 | 0.084 |
| 7 | 0.075 | 9,485 | 711.4 | 0.075 |
| 8 | 0.069 | 8,955 | 617.9 | 0.065 |
| 9 | 0.062 | 8,455 | 524.2 | 0.055 |
| 10 | 0.056 | 7,983 | 447.0 | 0.047 |
| 11 | 0.050 | 7,538 | 376.9 | 0.040 |
| 12 | 0.043 | 7,117 | 306.0 | 0.032 |
| 13 | 0.037 | 6,720 | 248.6 | 0.026 |
| 14 | 0.031 | 6,345 | 196.7 | 0.021 |
| 15 | 0.024 | 5,991 | 143.8 | 0.015 |
| 16 | 0.018 | 5,657 | 101.8 | 0.011 |
| 17 | 0.012 | 5,341 | 64.1 | 0.007 |
| 18 | 0.008 | 4,043 | 32.3 | 0.003 |
| 19 | 0.006 | 4,762 | 28.6 | 0.003 |
| 20+ | 0.008 | 4,496 | 36.0 | 0.004 |
|  |  | SUM: | 9,538.9 |  |

---

*Data derived from MOBILE3.

**Travel fractions are the same for diesel and gasoline fueled LDVs.

## TABLE 2-6

## CITY/HIGHWAY COMBINED ON-ROAD FUEL ECONOMY
(miles/gallon)

| Model Year | Fuel Economy, $E_{c,i,j}$ | | | | | |
|---|---|---|---|---|---|---|
| | LDV* | LDT1** | LDT2 | HDGV1+ | HDGV2 | HDGV++ |
| Pre-1970 | 13.9 | 10.6 | 7.9 | - | - | 6.5 |
| 1970 | 13.9 | 10.6 | 7.9 | - | - | 6.4 |
| 1971 | 13.2 | 10.4 | 7.7 | - | - | 6.4 |
| 1972 | 13.1 | 10.2 | 7.4 | - | - | 6.4 |
| 1973 | 12.9 | 9.9 | 7.0 | - | - | 6.5 |
| 1974 | 12.6 | 9.6 | 6.9 | - | - | 6.7 |
| 1975 | 13.5 | 11.6 | 8.8 | - | - | 6.8 |
| 1976 | 14.8 | 12.3 | 9.7 | - | - | 7.3 |
| 1977 | 15.5 | 13.0 | 9.4 | - | - | 7.7 |
| 1978 | 16.8 | 13.4 | 9.6 | - | - | 8.0 |
| 1979 | 17.2 | 14.2 | 9.8 | - | - | 8.2 |
| 1980 | 20.0 | 16.1 | 11.5 | - | - | 8.4 |
| 1981 | 21.4 | 17.7 | 13.3 | - | - | 8.6 |
| 1982 | 22.2 | 18.6 | 13.6 | - | - | 8.8 |
| 1983 | 22.2 | 19.2 | 13.7 | - | - | 8.9 |
| 1984 | 22.8 | 19.9 | 13.9 | - | - | 8.9 |
| 1985 | 23.2 | 20.7 | 14.0 | - | - | 9.0 |
| 1986 | 23.8 | 21.4 | 14.3 | - | - | 9.0 |
| 1987 | 24.3 | 23.0 | 14.5 | 9.5 | 5.6 | 9.0 |
| 1988 | 24.8 | 23.3 | 14.7 | 9.5 | 5.6 | 9.1 |
| 1989 | 25.2 | 23.1 | 14.9 | 9.6 | 5.6 | 9.2 |
| 1990 | 25.7 | 24.0 | 15.2 | 9.7 | 5.6 | 9.2 |
| 1991 | 26.2 | 24.5 | 15.4 | 9.7 | 5.7 | 9.3 |
| 1992 | 26.6 | 24.4 | 15.7 | 9.8 | 5.7 | 9.4 |
| 1993 | 27.2 | 25.3 | 15.9 | 9.8 | 5.7 | 9.4 |
| 1994 | 27.6 | 25.8 | 16.2 | 9.9 | 5.7 | 9.5 |
| 1995+ | 29.0 | 26.2 | 16.4 | 10.1 | 5.8 | 9.6 |

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*Fuel economies for LDV's based on EPA memo from Karl H. Hellman to Ralph C. Stahman regarding Light-Duty MPG, June 15, 1984.

**Fuel economies for LDT's drawn from the input data used to generate "The Highway Fuel Consumption Model: Tenth Quarterly Report," prepared by Energy and Environmental Analysis, Inc.

+Fuel economies for Heavy-duty gasoline vehicles (HDGV) were derived from figure presented in an EPA memo to Mark Wolcott from Cooper Smith, dated July 2, 1984.

++Pre-1986 fuel economies are composites of HDGV1 and HDGV2.

## TABLE 2-7

## FUEL ECONOMY CORRECTION FACTORS AT VARIOUS SPEEDS, $C_s$
(Normalized to 32.7 miles/hour-cyclic driving)

| | Speed (mph) | $C_s$ Cyclic Driving | $C_s$ Steady Cruise |
|---|---|---|---|
| | 5 | 0.323 | 0.467 |
| | 10 | 0.553 | 0.709 |
| | 15 | 0.692 | 0.997 |
| (FTP) | 20 | 0.790 | 1.153 |
| | 25 | 0.885 | 1.248 |
| | 30 | 0.963 | 1.294 |
| | 32.7 | 1.000 | 1.303 |
| (SET) | 35 | 1.022 | 1.303 |
| | 40 | 1.053 | 1.288 |
| | 45 | 1.073 | 1.256 |
| | 50 | 1.078 | 1.210 |
| | 55 | 1.063 | 1.159 |
| | 60 | 1.023 | 1.104 |

TABLE 2-8

FRACTION OF LIGHT-DUTY TRUCK I MODEL YEAR SALES EQUIPPED WITH DIFFERENT EMISSION CONTROL SYSTEMS (LOW-ALTITUDE NON-CALIFORNIA)

| System | Pre-1975 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988+ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $F_{L,2,j}$ | 1.000 | .188 | .088 | .038 | .027 | .03 | .021 | .026 | .021 | .022 | 0 | 0 | 0 | 0 | 0 |
| $F_{2,j,NL,NOCAT}$ | 0 | .123 | .225 | .083 | .069 | .034 | .027 | .011 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $F_{2,j,OXCAT/NOAIR}$ | 0 | .570 | .504 | .596 | .605 | .561 | .564 | .574 | .066 | .092 | .003 | 0 | 0 | 0 | 0 |
| $F_{2,j,OXCAT/AIR}$ | 0 | .307 | .271 | .321 | .325 | .405 | .409 | .415 | .887 | .687 | .595 | .550 | .550 | .150 | .150 |
| $F_{2,j,3WCAT}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .027 | .054 | .126 | .150 | .150 | .350 | .350 |
| $F_{2,j,3WCAT/OXCAT}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .021 | .167 | .276 | .300 | .300 | .500 | .500 |
| $F_{D,2,j}$ | 0 | .002 | .003 | .005 | .009 | .028 | .034 | .060 | .080 | .100 | .130 | .160 | .180 | .210 | .240 |
| $F_{2,j,CAT}$ | 0 | .877 | .775 | .917 | .930 | .966 | .973 | .989 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| $F_{2,j,CAT/NOAIR}$ | 0 | .570 | .504 | .596 | .605 | .561 | .564 | .574 | .069 | .073 | .056 | .080 | .080 | .200 | .200 |
| $F_{2,CAT/AIR}$ | 0 | .307 | .271 | .321 | .325 | .405 | .409 | .415 | .931 | .927 | .944 | .920 | .920 | .800 | .800 |

---

Sources: U.S. EPA Emission Factor In-Use Test Vehicle Data Base.
U.S. EPA Fuel Economy Data Base.
U.S. EPA Federal Register: Federal Certification Test Results 1975-78 and 1982-84.
EEA Estimates of Emission Control Systems Projections.

Note: Model year columns do not add up to 1.000. Only $F_{L,2,j}$ and $F_{D,2,j}$ are fractions of all LDTIs. All other systems are fractions of all unleaded LDTIs.

## TABLE 2-9

## FLEET SALES FRACTIONS
## Light-Duty Trucks I

| Model Years | Unleaded Gasoline Fraction of LDT1 Fleet, $F_{NL,2,j}$* | Leaded Gasoline Fraction of LDT1 Fleet, $F_{L,2,j}$ | Diesel Fraction of LDT1 Fleet, $F_{D,2,j}$** |
|---|---|---|---|
| Pre-1975 | 0.000 | 1.000 | 0.000 |
| 1975 | 0.810 | 0.188 | 0.002 |
| 1976 | 0.909 | 0.088 | 0.003 |
| 1977 | 0.957 | 0.038 | 0.005 |
| 1978 | 0.964 | 0.027 | 0.009 |
| 1979 | 0.942 | 0.030 | 0.028 |
| 1980 | 0.945 | 0.021 | 0.034 |
| 1981 | 0.914 | 0.026 | 0.060 |
| 1982 | 0.899 | 0.021 | 0.080 |
| 1983 | 0.878 | 0.022 | 0.100 |
| 1984 | 0.870 | 0.000 | 0.130 |
| 1985 | 0.840 | 0.000 | 0.160 |
| 1986 | 0.820 | 0.000 | 0.180 |
| 1987 | 0.790 | 0.000 | 0.210 |
| 1988 | 0.760 | 0.000 | 0.240 |
| 1989 | 0.730 | 0.000 | 0.270 |
| 1990 | 0.706 | 0.000 | 0.294 |
| 1991 | 0.697 | 0.000 | 0.303 |
| 1992 | 0.688 | 0.000 | 0.312 |
| 1993 | 0.679 | 0.000 | 0.321 |
| 1994 | 0.670 | 0.000 | 0.330 |
| 1995+ | 0.661 | 0.000 | 0.339 |

Where $F_{NL,2}$ = Estimated fraction of the LDT1 model year fleet which use nonleaded gasoline.
$F_{L,2}$ = Estimated fraction of the LDT1 model year fleet which use leaded gasoline.
$F_{D,2}$ = Estimated fraction of the LDT1 model year fleet which use diesel fuel.

---

*Percentages of gasoline vehicles requiring leaded and unleaded fuel obtained from Energy and Environmental Analysis, Inc., "The Highway Fuel Consumption Model: Tenth Quarterly Report," November 1983.

**Diesel and gasoline sales projections were derived from MOBILE3.

## TABLE 2-10

## TRAVEL WEIGHTING FACTOR CALCULATION*
## Light-Duty Gas Trucks I**

| Vehicle Age | (a) January 1 Fraction Total Registration | (b) Annual Mileage Accumulation Rate | (a)(b) | [(a)(b)/(SUM)] Fraction of LDV Travel by Model Year, $m_{2,j,G}$ |
|---|---|---|---|---|
| 1 | 0.023 | 17,394 | 400.1 | 0.036 |
| 2 | 0.089 | 17,079 | 1,520.0 | 0.135 |
| 3 | 0.085 | 15,839 | 1,346.3 | 0.120 |
| 4 | 0.081 | 14,690 | 1,189.9 | 0.106 |
| 5 | 0.076 | 13,624 | 1,035.4 | 0.092 |
| 6 | 0.072 | 12,636 | 909.8 | 0.081 |
| 7 | 0.068 | 11,719 | 796.9 | 0.071 |
| 8 | 0.064 | 10,868 | 695.6 | 0.062 |
| 9 | 0.060 | 10,080 | 604.8 | 0.054 |
| 10 | 0.055 | 9,348 | 514.1 | 0.046 |
| 11 | 0.050 | 8,670 | 433.5 | 0.039 |
| 12 | 0.046 | 8,041 | 369.9 | 0.033 |
| 13 | 0.042 | 7,457 | 313.2 | 0.028 |
| 14 | 0.038 | 6,916 | 262.8 | 0.023 |
| 15 | 0.034 | 6,415 | 218.1 | 0.019 |
| 16 | 0.029 | 5,949 | 172.5 | 0.015 |
| 17 | 0.025 | 5,517 | 137.9 | 0.012 |
| 18 | 0.021 | 5,117 | 107.5 | 0.009 |
| 19 | 0.017 | 4,746 | 80.7 | 0.007 |
| 20 | 0.025 | 4,402 | 110.1 | 0.010 |
|  |  | SUM: | 11,219.1 |  |

---

*Data derived from MOBILE3.

**Light-duty trucks I have a gross vehicle weight (GVW) rating of 6,000 pounds or less.

## TABLE 2-11

## FRACTION OF MODEL YEAR SALE OF LIGHT-DUTY TRUCKS II BY EMISSION CONTROL SYSTEMS

| System | Pre-1975 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $F_{L,3,j}$ | 1.000 | 1.000 | 1.000 | 1.000 | .988 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $F_{3,j,NL,NOCAT}$ | 0 | 0 | 0 | 0 | 0 | .008 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $F_{3,j,OXCAT}$ | 0 | 0 | 0 | 0 | 0 | .496 | .500 | .500 | .222 | .284 | 0 | 0 | 0 | 0 | 0 |
| $F_{3,j,OXCAT/AIR}$ | 0 | 0 | 0 | 0 | 0 | .496 | .500 | .500 | .704 | .577 | .823 | .800 | .800 | 0 | 0 |
| $F_{3,j,3WCAT}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .012 | .003 | 0 | 0 | .020 | .020 |
| $F_{3,j,3WCAT/OXCAT}$ | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | .074 | .127 | .174 | .200 | .200 | .980 | .980 |
| $F_{D,3,j}$ | 0 | 0 | 0 | 0 | .012 | .025 | .050 | .050 | .080 | .113 | .147 | .180 | .194 | .208 | .222 |
| $F_{3,j,CAT}$ | 0 | 0 | 0 | 0 | 0 | .992 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 | 1.000 |
| $F_{3,j,CAT/NOAIR}$ | 0 | 0 | 0 | 0 | 0 | .496 | .500 | .500 | .222 | .293 | 0 | 0 | 0 | .020 | .020 |
| $F_{3,CAT/AIR}$ | 0 | 0 | 0 | 0 | 0 | .496 | .500 | .500 | .778 | .707 | 1.000 | 1.000 | 1.000 | .980 | .980 |

---

Sources: U.S. EPA Emission Factor In-Use Test Vehicle Data Base.
U.S. EPA Federal Register: Federal Certification Test Results 1982-84.
EEA Estimates of Emission Control Systems Projections.

Note: Model year columns do not add up to 1.000. Only $F_{L,3,j}$ and $F_{D,3,j}$ are fractions of all LDT2s. All other systems are fractions of all unleaded LDT2s.

## TABLE 2-12

## FLEET SALES FRACTIONS
## Light-Duty Trucks II

| Model Years | Unleaded Gasoline Fraction of LDT2 Fleet, $F_{NL,3,j}$* | Leaded Gasoline Fraction of LDT2 Fleet, $F_{L,3,j}$** | Diesel Fraction of LDT2 Fleet, $F_{D,3,j}$** |
|---|---|---|---|
| Pre-1975 | 0.000 | 1.000 | 0.000 |
| 1975 | 0.000 | 0.998 | 0.002 |
| 1976 | 0.000 | 0.997 | 0.003 |
| 1977 | 0.000 | 0.995 | 0.005 |
| 1978 | 0.000 | 0.991 | 0.009 |
| 1979 | 0.972 | 0.000 | 0.028 |
| 1980 | 0.966 | 0.000 | 0.034 |
| 1981 | 0.940 | 0.000 | 0.060 |
| 1982 | 0.920 | 0.000 | 0.080 |
| 1983 | 0.900 | 0.000 | 0.100 |
| 1984 | 0.870 | 0.000 | 0.130 |
| 1985 | 0.840 | 0.000 | 0.160 |
| 1986 | 0.820 | 0.000 | 0.180 |
| 1987 | 0.790 | 0.000 | 0.210 |
| 1988 | 0.760 | 0.000 | 0.240 |
| 1989 | 0.730 | 0.000 | 0.270 |
| 1990 | 0.706 | 0.000 | 0.294 |
| 1991 | 0.697 | 0.000 | 0.303 |
| 1992 | 0.688 | 0.000 | 0.312 |
| 1993 | 0.679 | 0.000 | 0.321 |
| 1994 | 0.670 | 0.000 | 0.330 |
| 1995+ | 0.661 | 0.000 | 0.339 |

WHERE $F_{NL,3}$ = Estimated fraction of the LDT2 model year fleet which use nonleaded gasoline.

$F_{L,3}$ = Estimated fraction of the LDT2 model year fleet which use leaded gasoline.

$F_{D,3}$ = Estimated fraction of the LDT2 model year fleet which use diesel fuel.

---

*Percentages of gasoline vehicles requiring leaded and nonleaded fuel obtained from Energy and Environmental Analysis, Inc., "The Highway Fuel Consumption Model: Tenth Quarterly Report," November 1983.

**Diesel and gasoline sales projections were derived from MOBILE3.

## TABLE 2-13

## TRAVEL WEIGHTING FACTOR CALCULATION*
## Light-Duty Gas Trucks II**

| Vehicle Age | (a) January 1 Fraction Total Registration | (b) Annual Mileage Accumulation Rate | (a)(b) | [(a)(b)/(SUM)] Fraction of LDT2 Travel by Model Year, $m_{3,j,G}$ |
|---|---|---|---|---|
| 1 | 0.023 | 18,352 | 422.1 | 0.036 |
| 2 | 0.089 | 18,001 | 1,602.1 | 0.138 |
| 3 | 0.085 | 16,622 | 1,412.9 | 0.122 |
| 4 | 0.081 | 15,348 | 1,243.2 | 0.107 |
| 5 | 0.076 | 14,172 | 1,077.1 | 0.093 |
| 6 | 0.072 | 13,087 | 942.3 | 0.081 |
| 7 | 0.068 | 12,084 | 821.7 | 0.071 |
| 8 | 0.064 | 11,158 | 714.1 | 0.062 |
| 9 | 0.060 | 10,303 | 618.2 | 0.053 |
| 10 | 0.055 | 9,514 | 523.3 | 0.045 |
| 11 | 0.050 | 8,785 | 439.3 | 0.038 |
| 12 | 0.046 | 8,112 | 373.2 | 0.032 |
| 13 | 0.042 | 7,491 | 314.6 | 0.027 |
| 14 | 0.038 | 6,917 | 262.8 | 0.023 |
| 15 | 0.034 | 6,386 | 217.1 | 0.019 |
| 16 | 0.029 | 5,897 | 171.0 | 0.015 |
| 17 | 0.025 | 5,446 | 136.2 | 0.012 |
| 18 | 0.021 | 5,028 | 105.6 | 0.009 |
| 19 | 0.017 | 4,643 | 78.9 | 0.007 |
| 20+ | 0.025 | 4,287 | 107.2 | 0.009 |
|  |  | SUM: | 11,582.9 |  |

---

*Data derived from MOBILE3.

**Light-duty trucks II have a gross vehicle weight (GVW) rating of 6,001 to 8,500 pounds.

## TABLE 2-14

## TRAVEL WEIGHTING FACTOR CALCULATION*<br>Light-Duty Diesel Trucks I and II**

| Vehicle Age | (a) January 1 Fraction Total Registration | (b) Annual Mileage Accumulation Rate | (a)(b) | [(a)(b)/(SUM)] Fraction of LDDT I & II Travel by Model Year, $m_{i,j,D}$ |
|---|---|---|---|---|
| 1 | 0.023 | 17,552 | 403.7 | 0.035 |
| 2 | 0.087 | 17,230 | 1,499.0 | 0.129 |
| 3 | 0.083 | 15,964 | 1,325.0 | 0.114 |
| 4 | 0.079 | 14,791 | 1,168.5 | 0.101 |
| 5 | 0.075 | 13,705 | 1,027.9 | 0.088 |
| 6 | 0.071 | 12,699 | 901.6 | 0.078 |
| 7 | 0.066 | 11,766 | 776.6 | 0.067 |
| 8 | 0.062 | 10,901 | 675.9 | 0.058 |
| 9 | 0.058 | 10,101 | 585.9 | 0.050 |
| 10 | 0.054 | 9,359 | 505.4 | 0.043 |
| 11 | 0.049 | 8,671 | 424.9 | 0.037 |
| 12 | 0.045 | 8,035 | 361.6 | 0.031 |
| 13 | 0.041 | 7,444 | 305.2 | 0.026 |
| 14 | 0.037 | 6,897 | 255.2 | 0.022 |
| 15 | 0.033 | 6,391 | 210.9 | 0.018 |
| 16 | 0.029 | 5,921 | 171.7 | 0.015 |
| 17 | 0.025 | 5,487 | 137.2 | 0.012 |
| 18 | 0.020 | 5,084 | 101.7 | 0.009 |
| 19 | 0.016 | 4,710 | 75.4 | 0.006 |
| 20+ | 0.025 | 4,364 | 109.1 | 0.009 |
|  |  | SUM: | 11,622.4 |  |

---

*Data derived from MOBILE3.

**Light-duty trucks I and II have a gross vehicle weight (GVW) rating of 0-8,500 pounds.

## TABLE 2-15

## FLEET SALES FRACTIONS
## Heavy-Duty Gasoline Vehicles (HDGV)*

| Model Years | Unleaded Fraction of HDGV Fleet $F_{NL,4,j}$** | Leaded Fraction of HDGV Fleet $F_{L,4,j}$ |
|---|---|---|
| Pre-1977 | 0.000 | 1.000 |
| 1977 | 0.000 | 1.000 |
| 1978 | 0.000 | 1.000 |
| 1979 | 0.000 | 1.000 |
| 1980 | 0.000 | 1.000 |
| 1981 | 0.000 | 1.000 |
| 1982 | 0.000 | 1.000 |
| 1983 | 0.000 | 1.000 |
| 1984 | 0.000 | 1.000 |
| 1985 | 0.000 | 1.000 |
| 1986 | 0.000 | 1.000 |
| 1987 | 0.823 | 0.177 |
| 1988 | 0.824 | 0.176 |
| 1989 | 0.825 | 0.175 |
| 1990 | 0.826 | 0.174 |
| 1991 | 0.828 | 0.172 |
| 1992 | 0.829 | 0.171 |
| 1993 | 0.833 | 0.167 |
| 1994 | 0.837 | 0.163 |
| 1995 | 0.840 | 0.160 |

---

*Heavy-duty gasoline vehicles have a gross vehicle weight (GVW) rating greater than 8,501 pounds.

*The estimated fractions of the HDGV model year fleets which are gasoline-powered are consistent with figures from M.C. Smith, "Heavy-Duty Vehicle Emission Conversion Factors: 1962-1997," EPA-AA/SDSB-84-1, Office of Mobile Sources, August 1984.

## TABLE 2-16

## TRAVEL WEIGHTING FACTOR CALCULATION*
## Heavy-Duty Gasoline Vehicle (HDGV)**

| Vehicle Age | (a) January 1 Fraction Total Registration | (b) Annual Mileage Accumulation Rate | (a)(b) | [(a)(b)/(SUM)] Fraction of HDGT Travel by Model Year, $m_{4,j,G}$ |
|---|---|---|---|---|
| 1 | 0.000 | 0 | 0.0 | 0.000 |
| 2 | 0.148 | 19,967 | 2,955.1 | 0.227 |
| 3 | 0.126 | 18,077 | 2,277.7 | 0.175 |
| 4 | 0.107 | 16,365 | 1,751.1 | 0.134 |
| 5 | 0.092 | 14,815 | 1,363.0 | 0.105 |
| 6 | 0.078 | 13,413 | 1,046.2 | 0.080 |
| 7 | 0.067 | 12,143 | 813.6 | 0.062 |
| 8 | 0.058 | 10,993 | 637.6 | 0.049 |
| 9 | 0.049 | 9,952 | 487.6 | 0.037 |
| 10 | 0.041 | 9,010 | 369.4 | 0.028 |
| 11 | 0.036 | 8,156 | 293.6 | 0.023 |
| 12 | 0.030 | 7,384 | 221.5 | 0.017 |
| 13 | 0.026 | 6,685 | 173.8 | 0.013 |
| 14 | 0.022 | 6,052 | 133.1 | 0.010 |
| 15 | 0.020 | 5,479 | 121.0 | 0.009 |
| 16 | 0.016 | 4,960 | 79.4 | 0.006 |
| 17 | 0.014 | 4,490 | 62.9 | 0.005 |
| 18 | 0.012 | 4,065 | 48.8 | 0.004 |
| 19 | 0.010 | 3,680 | 36.8 | 0.003 |
| 20+ | 0.049 | 3,332 | 163.3 | 0.013 |
|  |  | SUM: | 13,035.5 |  |

---

*Data derived from MOBILE3.

**Heavy-duty gasoline vehicles have a gross vehicle weight (GVW) rating greater than 8,500 pounds.

## TABLE 2-17

## TRAVEL WEIGHTING FACTOR CALCULATION*
## For Heavy-Duty Diesel Vehicles in Calendar Year 1987

| Vehicle Age | (a) January 1 Fraction Total Registration | (b)** Annual Mileage Accumulation Rate | (a)(b) | $\left[(a)(b)/(SUM)\right]$ Fraction of HDTT 1 Travel by Model Year, $m_{5,j,D}$ |
|---|---|---|---|---|
| 1 | 0.000 | 0 | 0.0 | 0.000 |
| 2 | 0.166 | 67,910 | 11,273.1 | 0.241 |
| 3 | 0.13 | 61,749 | 8,521.4 | 0.182 |
| 4 | 0.115 | 56,155 | 6,457.8 | 0.138 |
| 5 | 0.097 | 51,073 | 4,954.1 | 0.106 |
| 6 | 0.080 | 46,457 | 3,716.6 | 0.079 |
| 7 | 0.067 | 42,260 | 2,831.4 | 0.060 |
| 8 | 0.056 | 38,447 | 2,153.0 | 0.046 |
| 9 | 0.047 | 34,982 | 1,644.2 | 0.035 |
| 10 | 0.040 | 31,832 | 1,273.3 | 0.027 |
| 11 | 0.033 | 28,968 | 955.9 | 0.020 |
| 12 | 0.027 | 26,363 | 711.8 | 0.015 |
| 13 | 0.023 | 23,995 | 551.9 | 0.012 |
| 14 | 0.019 | 21,43 | 415.0 | 0.009 |
| 15 | 0.015 | 19,883 | 298.2 | 0.006 |
| 16 | 0.013 | 18,101 | 235.3 | 0.005 |
| 17 | 0.011 | 16,41 | 181.3 | 0.004 |
| 18 | 0.009 | 15,007 | 135.1 | 0.003 |
| 19 | 0.008 | 13,665 | 109.3 | 0.002 |
| 20+ | 0.034 | 12,444 | 423.1 | 0.009 |
|  |  | SUM: | 46,841.8 |  |

---

*Data derived from MOBILE3.

**The tabulated annual mileage accumulation rate is specific to CY 1987 only. The rate shifts from one year to the next due to the increasing penetration of diesels in the lower mileage, lighter weight classes of the heavy-duty truck category (which contains all vehicles with a GVW rating over 8,500 pounds).

## TABLE 2-18

## TRAVEL WEIGHTING FACTOR CALCULATION*
### Motorcycles

| Vehicle Age | (a) January 1 Fraction Total Registration | (b) Annual Mileage Accumulation Rate | (a)(b) | [(a)(b)/(SUM)] Fraction of MC Travel by Model Year, $m_{6,j,G}$ |
|---|---|---|---|---|
| 1 | 0.000 | 0 | 0.0 | 0.000 |
| 2 | 0.167 | 4,100 | 685.7 | 0.356 |
| 3 | 0.159 | 2,800 | 445.7 | 0.232 |
| 4 | 0.134 | 2,100 | 281.0 | 0.146 |
| 5 | 0.142 | 1,600 | 227.0 | 0.118 |
| 6 | 0.131 | 1,200 | 157.8 | 0.082 |
| 7 | 0.080 | 800 | 63.7 | 0.033 |
| 8 | 0.051 | 600 | 30.4 | 0.016 |
| 9 | 0.028 | 400 | 11.1 | 0.001 |
| 10 | 0.010 | 200 | 2.1 | 0.010 |
| 11 | 0.098 | 200 | 19.6 | 0.000 |
| 12 | 0.000 | 200 | 0.0 | 0.000 |
| 13 | 0.000 | 0 | 0.0 | 0.000 |
| 14 | 0.000 | 0 | 0.0 | 0.000 |
| 15 | 0.000 | 0 | 0.0 | 0.000 |
| 16 | 0.000 | 0 | 0.0 | 0.000 |
| 17 | 0.000 | 0 | 0.0 | 0.000 |
| 18 | 0.000 | 0 | 0.0 | 0.000 |
| 19 | 0.000 | 0 | 0.0 | 0.000 |
| 20+ | 0.000 | 0 | 0.0 | 0.000 |
|  |  | SUM: | 1,924.0 |  |

---

*Data derived from MOBILE3.

## TABLE 2-19

## RATES OF MISFUELING ($r_i$) FOR DIFFERENT VEHICLE CLASSES*

| | I/M | Non-I/M |
|---|---|---|
| Light-Duty Vehicles (i=1) | 0.09 | 0.20 |
| Light-Duty Trucks I (i=2) | 0.20 | 0.46 |
| Light-Duty Trucks II (i=3) | 0.21 | 0.47 |
| Heavy-Duty Gasoline Vehicles (i=4)** | 0.19 | 0.40 |
| Motorcycles (i=6) | 0 | 0 |

---

*Values in this table are expressed as fractions of the total number of vehicles in each class. Misfueling rates are determined for the weighted average mileage accumulated for each vehicle class.

**Misfueling rates for Heavy-Duty Gasoline Vehicles pertain only to heavy-duty gasoline vehicles 1 made after model year 1986.

SOURCES: The equations used to estimate misfueling as a function of mileage for I/M and non-I/M areas are drawn from "Anti-Tampering and Anti-Misfueling Programs to Reduce In-Use Emissions from Motor Vehicles," EPA-AA-TSS-83-10, Office of Mobile Sources, December 31, 1983.

Weighted average mileages by vehicle category are calculated from data contained in MOBILE3.

## TABLE 2-19a

## RATES OF MISFUELING ($r_1$) FOR DIFFERENT VEHICLE AGES AND CLASSES*

| Vehicle Age | LDV |  | LDTI |  | LDTII |  | HDGV1 |  |
|---|---|---|---|---|---|---|---|---|
|  | Non-I/M | I/M | Non-I/M | I/M | Non-I/M | I/M | Non-I/M | I/M |
| 1 | .04 | .04 | .22 | .13 | .23 | .13 | .18 | .12 |
| 2 | .07 | .05 | .27 | .14 | .27 | .15 | .23 | .13 |
| 3 | .10 | .06 | .31 | .16 | .32 | .16 | .28 | .15 |
| 4 | .13 | .07 | .35 | .17 | .36 | .17 | .32 | .16 |
| 5 | .16 | .08 | .38 | .18 | .39 | .18 | .36 | .17 |
| 6 | .18 | .09 | .42 | .19 | .43 | .19 | .39 | .18 |
| 7 | .21 | .09 | .45 | .20 | .46 | .20 | .42 | .19 |
| 8 | .23 | .10 | .47 | .21 | .49 | .21 | .45 | .20 |
| 9 | .25 | .11 | .50 | .21 | .51 | .22 | .48 | .21 |
| 10 | .27 | .11 | .52 | .22 | .54 | .23 | .50 | .22 |
| 11 | .29 | .12 | .55 | .23 | .56 | .23 | .52 | .22 |
| 12 | .31 | .12 | .57 | .24 | .58 | .24 | .54 | .23 |
| 13 | .33 | .13 | .59 | .24 | .60 | .25 | .56 | .23 |
| 14 | .34 | .13 | .60 | .25 | .62 | .25 | .57 | .24 |
| 15 | .36 | .14 | .62 | .25 | .63 | .26 | .59 | .24 |
| 16 | .37 | .14 | .64 | .26 | .65 | .26 | .60 | .25 |
| 17 | .39 | .15 | .65 | .26 | .66 | .26 | .61 | .25 |
| 18 | .40 | .15 | .66 | .26 | .68 | .27 | .62 | .25 |
| 19 | .41 | .15 | .68 | .27 | .69 | .27 | .63 | .25 |
| 20+ | .42 | .16 | .69 | .27 | .70 | .28 | .64 | .26 |

---

*Values in this table are expressed as fractions of the total number of vehicles in each class. Misfueling rates are determined for the average mileage in each class. Misfueling rates are determined for the average mileage accumulated by each vehicle class of each vehicle age group.

**Misfueling rates for Heavy-Duty Gasoline Vehicles 1 (HDGV1) are estimates for 1987 and later calendar years. Currently all HDGV1s use leaded fuel. (For example, for the year 1990, use the first three values in either the non-I/M or I/M HDGV1 column. All HDGV1s greater than 3 years old in this case (i.e., pre-1987 vehicles) would have a misfueling rate of zero since they do not require use of unleaded fuel.

SOURCES: The equations used to estimate misfueling as a function of mileage for I/M and non-I/M areas are drawn from "Anti-Tampering and Anti-Misfueling Programs to Reduce In-Use Emissions from Motor Vehicles," EPA-AA-TSS-83-10, Office of Mobile Sources, December 31, 1983.

Weighted average mileages by vehicle category are calculated from data contained in MOBILE3.

## TABLE 2-20

## AVERAGE DATA ON PARTICLE SIZE DISTRIBUTION

| Leaded Fuel, $M_L$ | Cumulative Fraction of Particulate Mass Smaller Than Diameter | | |
|---|---|---|---|
| | 0.2 μ | 2 μ | 10 μ |
| Median Particle Fractions, $M_L$ | 0.23 | 0.43 | 0.64 |
| Ranges of $M_L$ Values* | 0.18-0.28 | 0.28-0.58 | 0.45-0.84 |

---

References: (author summary of) Ninomiya et al, 1970; Moran et al, 1971; Gental et al, 1973; Cantwell et al, 1972; Boyer and Laitiner, 1975; Habibi et al, 1970; Hirschler and Gilbert, 1964.

| Unleaded Fuel, $M_{NL}$ | Cumulative Fraction of Particulate Mass Smaller Than Diameter | | |
|---|---|---|---|
| | 0.2 μ | 2 μ | 10 μ |
| $M_{NL,C}$ | 0.87 | 0.89 | 0.97 |
| Ranges of $M_{NL,C}$ Valves** | 0.86-0.88 | 0.84-0.94 | 0.84-1.00 |
| $M_{NL,NC}$ | 0.42 | 0.66 | 0.90 |
| Ranges of $M_{NL,C}$ Valves | 0.29-0.55 | 0.52-0.80 | 0.63-1.00 |

---

References: (author summary of) Foster et al, 1976; Trayser et al, 1976; Foster et al, 1974; Melton et al, 1973; Habibi, 1973; Gental et al, 1973.

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*95 percent confidence intervals on mean of data.

**95 percent confidence intervals by "t" statistics.

TABLE 2-20

AVERAGE DATA ON PARTICLE SIZE DISTRIBUTION (cont'd)

| | Cumulative Fraction of Particulate Mass Smaller Than Diameter | | | | |
|---|---|---|---|---|---|
| Diesel Fuel, $M_D$ | 0.2 μ | 1.0 μ | 2.0 μ | 2.5 μ | 10 μ |
| $M_D$ | 0.73 | 0.86 | 0.90 | 0.92 | 1.00 |
| Ranges of $M_D$ Values[+] | 0.69-0.75 | 0.76-0.93 | 0.86-0.95 | 0.88-0.95 | 0.97-1.00 |

References: Breslin, et al, 1976; Hare, 1979, Bykowski, 1981; Bykowski, 1983; McCain and Faulkner, 1979; Vuk, et al, 1976; Begeman, 1979; Carpenter and Johnson, 1979; Verrant and Kittelson, 1977.

| | Cumulative Fraction of Particulate Mass Smaller Than Diameter | | | | |
|---|---|---|---|---|---|
| Brake Wear Particulate, $M_B$ | 0.43 μ | 1.1 μ | 4.7 μ | 7 μ | 10 μ |
| Median Particle Fractions, $M_B$[++] | 0.09 | 0.16 | 0.82 | 0.90 | 0.98 |
| Ranges of $M_B$ Values | Not available | | | | |

Reference: Cha et al, 1983.

---

[+] Intermediate speed, no load, prechamber engine, 2D fuel.

[++] Samples for determining particle size distribution were collected by running about 20 braking cycles weighted to be representative of urban driving conditions.

## TABLE 2-21

## LOW ALTITUDE HDDV CONVERSTION FACTORS*

| Model Year | Conversion Factor ($CF_j$) |
|---|---|
| 1951-1962 | 2.7420 |
| 1963-1965 | 2.7307 |
| 1966-1968 | 2.8267 |
| 1969-1971 | 3.0080 |
| 1972-1974 | 3.1917 |
| 1975-1979 | 3.1420 |
| 1980-1981 | 2.7780 |
| 1982-1984 | 2.5580 |
| 1985 | 2.4700 |
| 1986 | 2.4260 |
| 1987-1992 | 2.3600 |
| 1993-1996 | 2.3175 |
| 1997-2000 | 2.3100 |

---

*These factors are used to convert emissions in g/Bhp-hr to g/mile. They are consistent with those contained in M.C. Smith, "Heavy-Duty Vehicle Emission Conversion Factors: 1962-1977," EPA-AA-SDSB-84-1, Office of Mobile Sourcs, August 1984.

# TABLE 2-22

# FRACTION OF LEAD BURNED THAT IS EMITTED, $a_s$

| | $a_{s1,j}$* | | $a_{s2,j}$** |
|---|---|---|---|
| All years | .75 | 1975-1980 | .40 |
| | | 1981+ | .44 |

---

*$a_{s1,j}$ is used for all vehicles using unleaded gasoline and for vehicles without catalysts using leaded gasoline.

**$a_{s2,j}$ is used for catalyst equipped vehicles using leaded gasoline.

## TABLE 2-23

## FRACTION OF CATALYST EQUIPPED VEHICLES WITH CATALYST REMOVED, $P_i$*

| | $P_1$ | $P_2$ and $P_3$ |
|---|---|---|
| I/M | .017 | .050 |
| Non-I/M | .045 | .195 |

---

*Fractions obtained from "Anti-Tampering and Anti-Misfueling Programs to Reduce In-Use Emissions From Motor Vehicles," U.S. EPA, December 1983.

Figure 2-1

LEADED GASOLINE PARTICULATE SIZE DISTRIBUTION

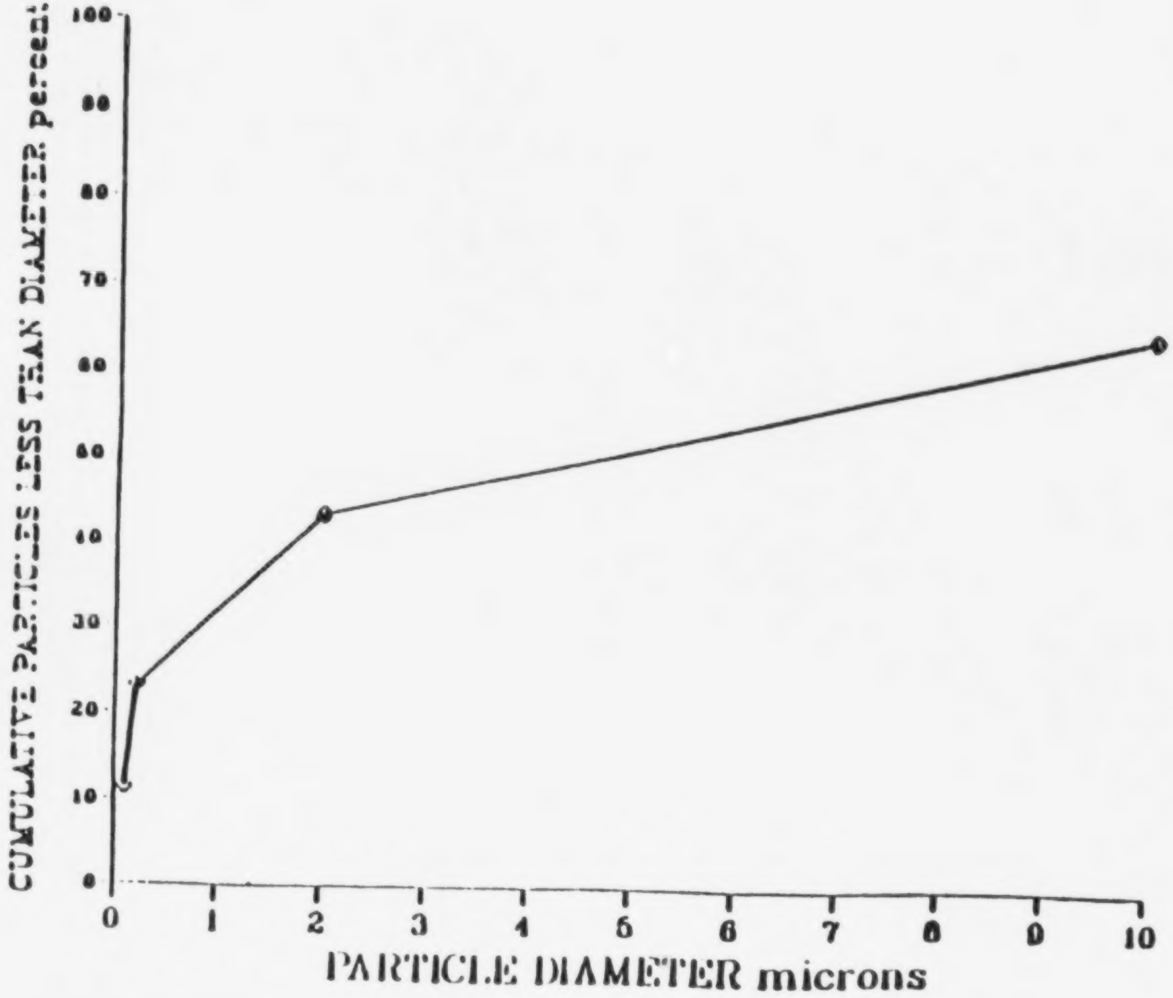


Figure 2-2

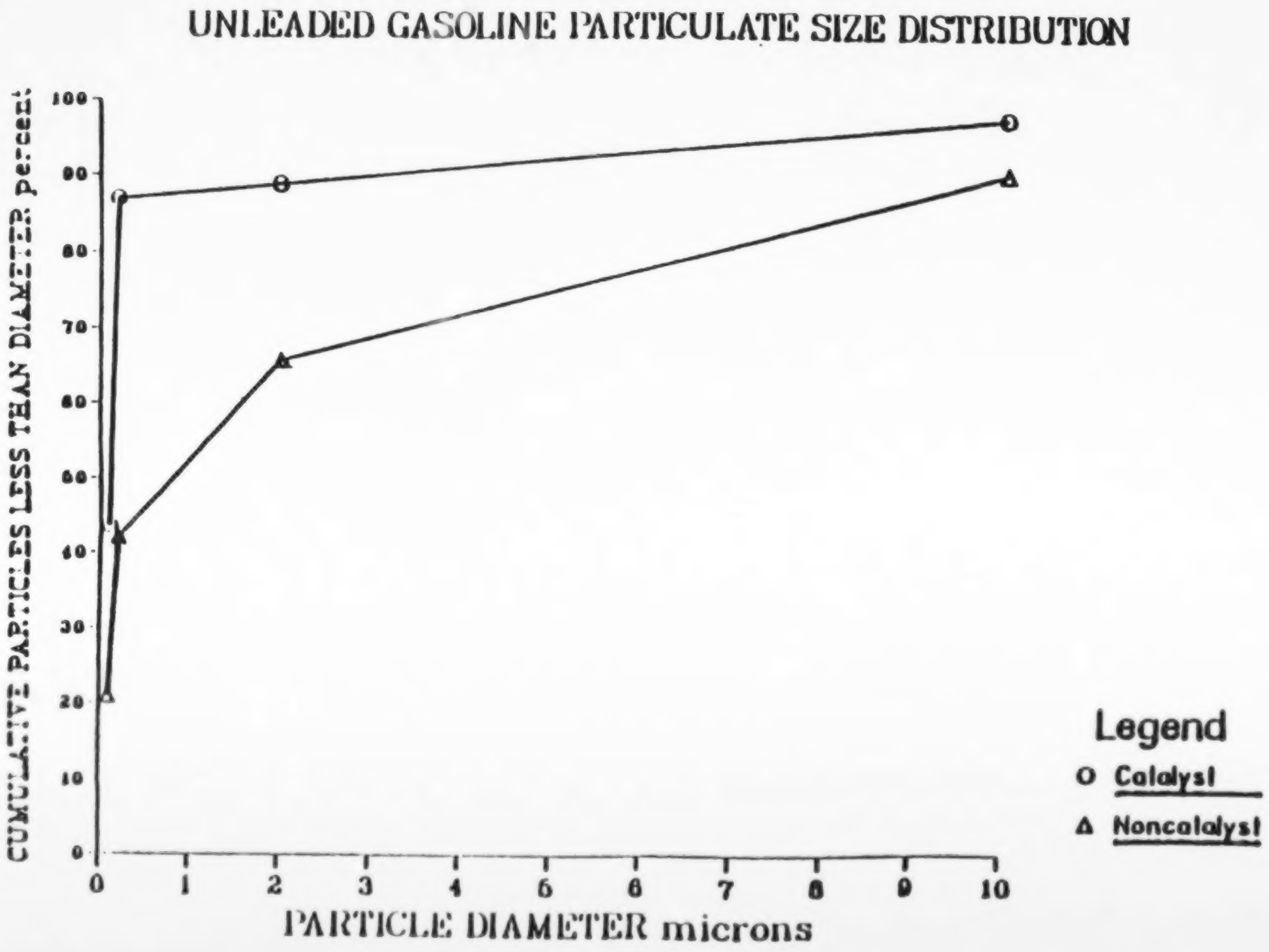

UNLEADED GASOLINE PARTICULATE SIZE DISTRIBUTION
CUMULATIVE PARTICLES LESS THAN DIAMETER percent
100
90
80
70
60
50
40
30
20
10
0
0
1
2
3
4
5
6
7
8
9
10
PARTICLE DIAMETER microns
Legend
O Catalyst
Δ Noncatalyst

Figure 2-3

DIESEL PARTICULATE SIZE DISTRIBUTION

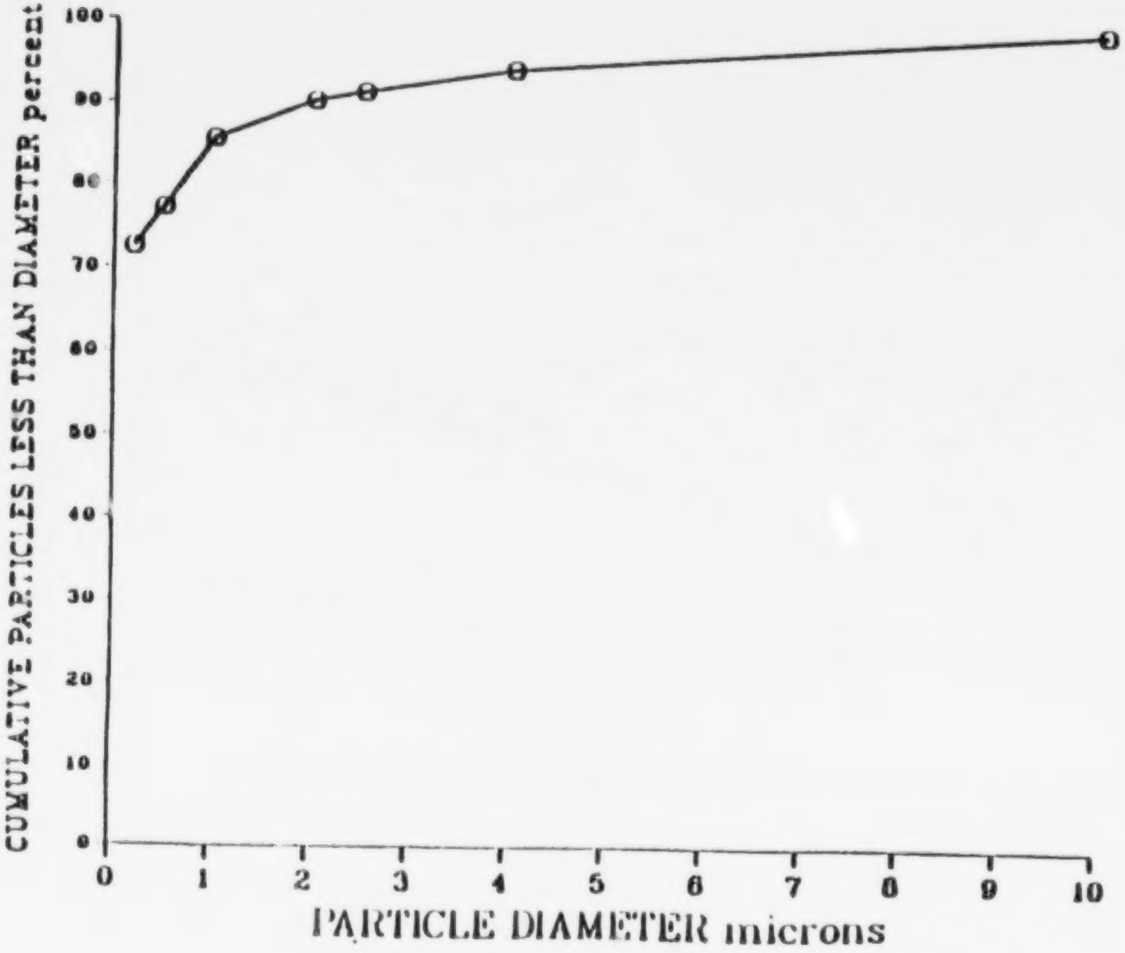
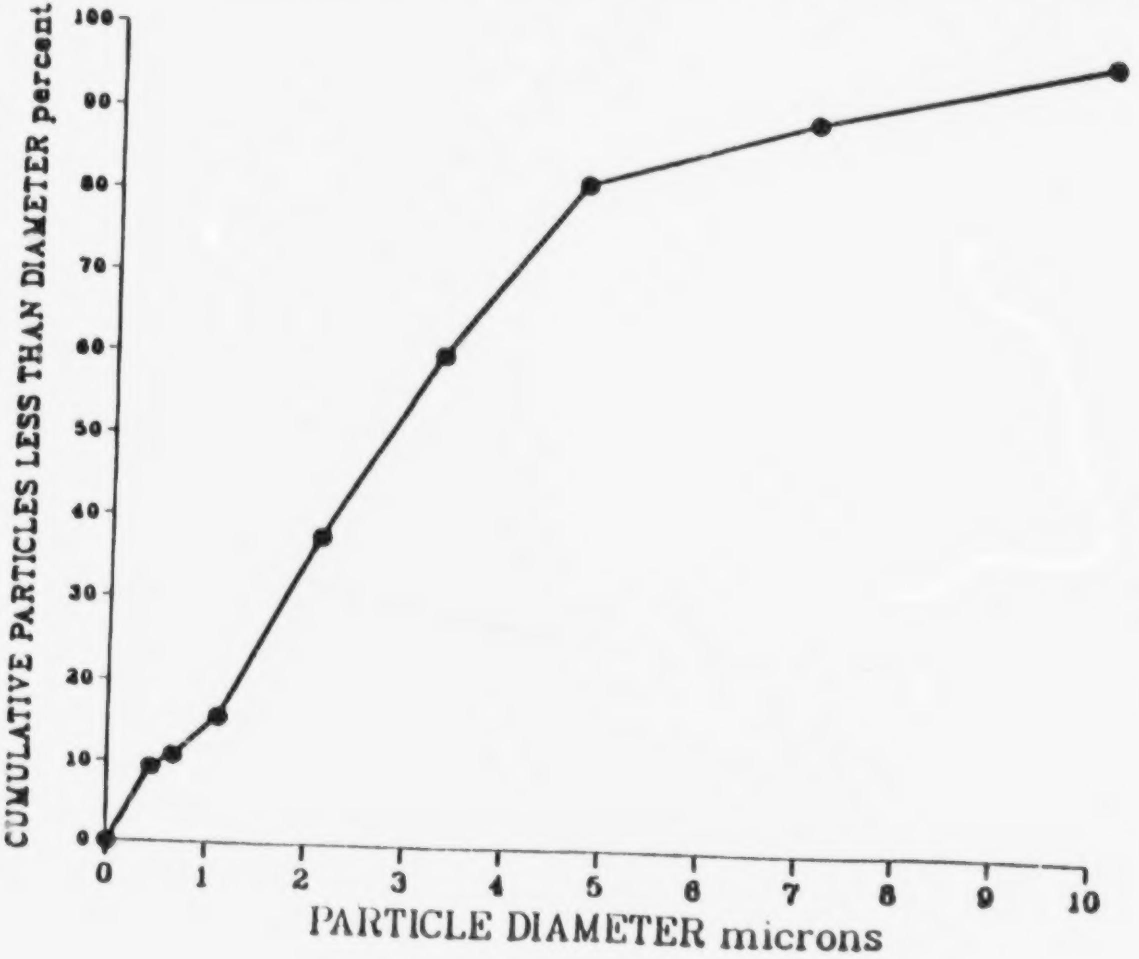


Figure 2-4

BRAKE WEAR PARTICULATE SIZE DISTRIBUTION



# 3. EXAMPLE CALCULATION OF AUTOMOBILE PARTICULATE EMISSIONS LESS THAN 10 MICRONS

## PROBLEM

For an area characterized by light-duty vehicles driving under cyclic conditions with an average speed of 19.6 miles per hour, calculate the particulate emission rate of particles less than 10 μ in diameter for the year 1985. Assume an inspection and maintenance program has been implemented in this area. The simplified misfueling rates from Table 2-19 will be used.

## SOLUTION

Use equations (2-1), (2-2), (2-3), (2-4), (2-5), (2-6), (2-7), (2-8), (2-9), (2-10), (2-12), (2-14), and (2-15).

Particulate Matter Size Cutoff = 10 μ

$n=1985$  $i=1=\text{LDV}$  $s=19.6$ mph  $M_B=0.98$

$t_{1,1985} = 1.0$  $r_i$ (from Table 2-19) $= 0.09$

### Base Equation (2-1): Total Particulate Emission Factors Vehicle Exhaust Particulate Component and Airborne Brake Wear Component and Airborne Tire Wear Component

$$EF_{PM10,1985,19.6} = (1.0)(EF_{1,1985,19.6}) + (0.0128)(0.98) + (0.002)$$

### Total Vehicle Exhaust Particulate Emission Component (2-2)*:

$$EF_{1,1985,19.6} = \sum_{j=1966}^{1985} \Big[ (EF_{1,1985,19.6}) + EF_{1,j,k_2,L} + EF_{1,j,k_3,L})$$

$$\times (F_{L,1,j}) + (EF_{1,j,k_1,1985,NL} + EF_{1,j,k_2,NL} + EF_{1,j,k_3,NL})$$

$$\times (F_{NL,1,j}) \Big] M_{i,j,G} + (EF_{1,j,D})(F_{D,1,j})\ m_{1,j,D}$$

where $Pb_{L,1985} = 1.1$ (g/gal)

$Pb_{NL,1985} = 0.014$ (g/gal)

$M_{L,10} = 0.64$

$M_{NL,C,10} = 0.97$

$M_{NL,C,10} = 0.90$

$M_D = 1.00$

$a_s$ = from Table 2-22

$C_s = 0.79$

$P_i = 0.017$

Using the following equations to plug into Equation (2-2) and sum over the appropriate model years:

### Lead Emission Factor Component (2-3a): Leaded Fuel

For j=1966-1970 k=1

$$EF_{1,j,k_1,1985,L} = \Big[(1.1)(.887)(0.64) + (0.014)(0.113)(0.90)\Big]$$

$$\times \frac{(0.75)(1.557)}{(E_{c1,j})(0.79)} = \frac{.925}{E_{c,i,j}}$$

---

---

*The numbers in ( ) in equation titles refer to the equations presented in Section 2.

### Lead Emission Factor Component (2-3b): Leaded Fuel

For $j=1971-1974 \quad k=1$

$$EF_{1,j,k_1,1985,L} = \Big[(1.1)(.916)(0.64) + (0.014)(0.084)(0.90)\Big]$$

$$\times \frac{(0.75)(1.557)}{(E_{c,i,j})(0.79)} = \frac{.955}{E_{c,i,j}}$$

---

### Lead Emission Factor Component (2-4): Leaded Fuel

For $j=1975-1985 \quad k=1$

$$EF_{1,j,k_1,1985,L} = \Big[(1.1)(0.724)(0.64) + (0.014)(0.276)(0.90)\Big]$$

$$\times \frac{(0.75)(1.557)}{(E_{c,i,j})(0.79)} = \frac{.7586}{E_{c,i,j}}$$

---

### Lead Emission Factor Component (2-5): Unleaded Fuel

For $j=1975-1985 \quad k=1$

$$EF_{1,j,k_1,1985,NL} = \Big[(0.014)(0.91)(0.97)(0.75)$$

$$+ (1.1)(0.09)(0.64) \Big(F_{i,j,NL,NOCAT} + (0.17)$$

$$(F_{i,j,NL,CAT})\Big) (0.75)$$

$$+ (1.1)(0.09)(0.64)(.983)(F_{i,j,NL,CAT})(a_{s2,j})\Big]$$

$$\times \frac{1.557}{E_{c,1,j}(0.79)}$$

$$= 1.557\left[\frac{(.009) + F_{i,j,NL,NOCAT} + (.017)(F_{i,j,NL,CAT})(.048) + (.062)F_{i,j,NL,CAT}(a_{s2,j})}{E_{c,1,j}(0.79)}\right]$$

$$= \frac{X_{,j}}{E_{c,i,j}}$$

|  | $X_{,j}$ |
|---|---|
| 1985 | .0731 |
| 1984 | .0731 |
| 1983 | .0731 |
| 1982 | .0731 |
| 1981 | .0731 |
| 1980 | .0682 |
| 1979 | .0682 |
| 1978 | .0682 |
| 1977 | .0682 |
| 1976 | .0694 |
| 1975 | .0717 |

---

## Organic Emission Factor Component (2-6): Leaded Fuel

For j=1966-1969 k=2

$$EF_{1,j,k_2,L} = (0.193)(0.64) = 0.124 \text{ (g/mile)}$$

---

## Organic Emission Factor Components (2-7): Leaded Fuel

For j=1970-1974 k=2

$$EF_{1,j,k_2,L} = (0.068)(0.64) = 0.044 \text{ (g/mile)}$$

---

## Organic Emission Factor Component (2-8): Leaded Fuel

For j=1975-1985 k=2

$$EF_{1,j,k_2 L} = (0.030)(0.64) = 0.019 \text{ (g/mile)}$$

---

### Organic Emission Factor Component (2-9): Unleaded Fuel

For j=1975-1985   k=2

$$
\begin{aligned}
EF_{1,j,k_2,NL} &= (0.91)(F_{i,j,CAT})(0.017)(0.97) \\
&+ (0.09)(F_{1,j,CAT})(0.068)(0.64) \\
&+ (F_{1,j,NL,NOCAT})(0.030)(0.90) \\
&= (0.019)(F_{1,j,CAT}) + (0.027)(F_{1,j,NL,NOCAT})
\end{aligned}
$$

### Sulfate Emission Factor Component (2-10): Leaded Fuel

For j=1966-1985   k=3

$$EF_{1,j,k_3,L} = (0.002)(0.64) = 0.001 \text{ (g/mile)}$$

### Sulfate Emission Factor Component (2-12): Unleaded Fuel

For j=1975-1985   k=3

$$
\begin{aligned}
EF_{1,j,k_3,NL} &= (0.91) \Big[ (F_{1,j,CAT/NOAIR})(0.005)(0.97) \\
&+ (F_{1,j,CAT/AIR})(0.016)(0.97) \\
&+ (F_{1,j,NL,NOCAT})(0.002)(0.90) \Big] + (0.09)(0.002)(0.64) \\
&= \Big[ (F_{1,j,CAT/NOAIR})(0.004) + )F_{1,j,CAT/AIR})(0.016) \\
&+ (F_{1,j,NL,NOCAT})(0.002) \Big] + 0.0001
\end{aligned}
$$

### Diesel Particulate Emission Factor Component (2-14)

For j=1966-1980

$$EF_{1,j,D} = (0.700)(1.00) = 0.700 \text{ (g/mile)}$$

## Diesel Particulate Emission Factor Component (2-15)

For j=1981-1985

$$EF_{1,j,D} = (0.300)(1.00) = 0.300 \text{ (g/mile)}$$

Table 3-1 presents the inputs and the sequence of calculations necessary to derive the LDV exhaust particulate emission factor components (using the above equations) and the total LDV exhaust particulate emission rate, $EF_{1,1985,19.6}$. This estimate is then combined with the airborne brake wear and airborne tire wear particulate components to obtain the total LDV particulate emission rate:

$$EF_{PM10,1985,19.6} = (1.0)(0.0581) + 0.0125 + 0.002 = 0.0726 \text{ (g/mile)}$$

This example is an estimate of particulate emissions from light-duty vehicles only. Therefore, the total emission rate from all vehicle classes for an area in calendar year 1985 can be expected to be considerably higher.

## TABLE 3-1

### EXAMPLE CALCULATIONS
### LIGHT-DUTY VEHICLE PARTICULATE EMISSION RATE LESS THAN 10 MICRONS FOR THE YEAR 1985

A. Emission Factor Component Calculation Inputs

| Model Year$_j$ | Age | $m_{1,j}$ | $F_{NL,1,j}$ | $F_{L,1,j}$ | $E_{c1,j}$ | $F_{D,1,j}$ | $F_{1,j,}$ CAT | $F_{1,j,NL,}$ NOCAT | $F_{1,j,}$ CAT/NOAIR | $F_{1,j,}$ CAT/AIR |
|---|---|---|---|---|---|---|---|---|---|---|
| 1985 | 1 | 0.038 | 0.934 | - | 24.6 | 0.066 | 1.000 | - | 0.381 | 0.691 |
| 1984 | 2 | 0.142 | 0.940 | - | 23.8 | 0.060 | 1.000 | - | 0.237 | 0.763 |
| 1983 | 3 | 0.125 | 0.947 | - | 23.2 | 0.053 | 1.000 | - | 0.194 | 0.806 |
| 1982 | 4 | 0.111 | 0.954 | - | 22.9 | 0.046 | 1.000 | - | 0.149 | 0.851 |
| 1981 | 5 | 0.098 | 0.939 | - | 21.5 | 0.061 | 1.000 | - | 0.296 | 0.704 |
| 1980 | 6 | 0.084 | 0.966 | 0.000 | 19.6 | 0.034 | 1.000 | - | 0.474 | 0.526 |
| 1979 | 7 | 0.075 | 0.875 | 0.097 | 17.8 | 0.028 | 1.000 | - | 0.655 | 0.345 |
| 1978 | 8 | 0.065 | 0.865 | 0.126 | 16.6 | 0.009 | 1.000 | - | 0.650 | 0.350 |
| 1977 | 9 | 0.055 | 0.838 | 0.158 | 15.5 | 0.004 | 1.000 | - | 0.650 | 0.350 |
| 1976 | 10 | 0.047 | 0.863 | 0.134 | 14.8 | 0.003 | 0.980 | 0.020 | 0.637 | 0.343 |
| 1975 | 11 | 0.040 | 0.869 | 0.128 | 13.8 | 0.003 | 0.919 | 0.081 | 0.597 | 0.322 |
| 1974 | 12 | 0.032 | - | 1.000 | 12.6 | - | - | - | - | - |
| 1973 | 13 | 0.026 | - | 1.000 | 12.9 | - | - | - | - | - |
| 1972 | 14 | 0.021 | - | 1.000 | 13.1 | - | - | - | - | - |
| 1971 | 15 | 0.015 | - | 1.000 | 13.2 | - | - | - | - | - |
| 1970 | 16 | 0.011 | - | 1.000 | 13.9 | - | - | - | - | - |
| 1969 | 17 | 0.007 | - | 1.000 | 13.9 | - | - | - | - | - |
| 1968 | 18 | 0.003 | - | 1.000 | 13.9 | - | - | - | - | - |
| 1967 | 19 | 0.003 | - | 1.000 | 13.9 | - | - | - | - | - |
| 1966- | 20+ | 0.004 | - | 1.000 | 13.9 | - | - | - | - | - |

## TABLE 3-1 (cont'd)

## EXAMPLE CALCULATIONS
## LIGHT-DUTY VEHICLE PARTICULATE EMISSION RATE LESS THAN 10 MICRONS FOR THE YEAR 1985

### B. Emission Factor Component Summation Descriptions

Summation (1) calculates the emission factor component in Equations (2-3a), (2-3b), and (2-4) that are used in Equation (2-2).

Summation (2) calculates the emission factor component in Equation (2-5) that is used in Equation (2-2).

Summation (3) calculates the emission factor component in Equations (2-6), (2-7), and (2-8) that are used in Equation (2-2).

Summation (4) calculates the emission factor component in Equation (2-9) that is used in Equation (2-2).

Summation (5) calculates the emission factor component in Equation (2-10) that is used in Equation (2-2).

Summation (6) calculates the emission factor component in Equation (2-12) that is used in Equation (2-2).

Summation (7) calculates the emission factor component in Equations (2-14) and (2-15) that are used in Equation (2-2).

# TABLE 3-1

## EXAMPLE CALCULATIONS
## LIGHT-DUTY VEHICLE PARTICULATE EMISSION RATE LESS THAN 10 MICRONS FOR THE YEAR 1985 (cont'd)

### C. Emission Factor Component Calculations

| Model Year, $j$ | (1)<br>$(EF_{1,j,k_1,1985,L})$<br>$(F_{L,1,j})(m_{1,j})$ | | (2)<br>$(EF_{1,j,k_1,1985,NL})$<br>$(F_{NL,1,j})(m_{1,j})$ | | (3)<br>$(EF_{1,j,k_2,L})$<br>$(F_{L,1,j})(m_{1,j})$ | | (4)<br>$(EF_{1,j,k_2,NL})$<br>$(F_{NL,1,j})(m_{1,j})$ | | (5)<br>$(EF_{1,j,k_3,L})$<br>$(F_{L,1,j})(m_{1,j})$ | | (6)<br>$(EF_{1,j,k_3,NL})$<br>$(F_{NL,1,j})(m_{1,j})$ | | (7)<br>$(EF_{1,j,D})$<br>$(F_{D,1,j})(m_{1,j})$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1985 | - | | 0.0001 | | - | | 0.0007 | | - | | 0.0004 | | 0.0008 |
| 1984 | - | | 0.0004 | | - | | 0.0025 | | - | | 0.0017 | | 0.0026 |
| 1983 | - | | 0.0004 | | - | | 0.0022 | | - | | 0.0016 | | 0.0020 |
| 1982 | - | | 0.0003 | | - | | 0.0020 | | - | | 0.0015 | | 0.0015 |
| 1981 | - | | 0.0003 | | - | | 0.0017 | | - | | 0.0011 | | 0.0018 |
| 1980 | - | | 0.0003 | | - | | 0.0015 | | - | | 0.0008 | | 0.0020 |
| 1979 | 0.0003 | | 0.0003 | | 0.0001 | | 0.0012 | | 0.00001 | | 0.0005 | | 0.0015 |
| 1978 | 0.0004 | | 0.0002 | | 0.0002 | | 0.0011 | | 0.00001 | | 0.0005 | | 0.0004 |
| 1977 | 0.0004 | | 0.0002 | | 0.0002 | | 0.0009 | | 0.00001 | | 0.0004 | | 0.0001 |
| 1976 | 0.0003 | | 0.0002 | | 0.0001 | | 0.0008 | | 0.00001 | | 0.0003 | | 0.0001 |
| 1975 | 0.0003 | | 0.0002 | | 0.0001 | | 0.0007 | | 0.00001 | | 0.0003 | | 0.0001 |
| 1974 | 0.0024 | | - | | 0.0014 | | - | | 0.00003 | | - | | - |
| 1973 | 0.0019 | | - | | 0.0011 | | - | | 0.00003 | | - | | - |
| 1972 | 0.0015 | | - | | 0.0009 | | - | | 0.00002 | | - | | - |
| 1971 | 0.0010 | | - | | 0.0007 | | - | | 0.00002 | | - | | - |
| 1970 | 0.0007 | | - | | 0.0004 | | - | | 0.00001 | | - | | - |
| 1969 | 0.0005 | | - | | 0.0009 | | - | | 0.00001 | | - | | - |
| 1968 | 0.0002 | | - | | 0.0004 | | - | | 0.00000 | | - | | - |
| 1967 | 0.0002 | | - | | 0.0004 | | - | | 0.00000 | | - | | - |
| 1966- | 0.0003 | | - | | 0.0005 | | - | | 0.00000 | | - | | - |
| SUM: | 0.0104 | + | 0.0029 | + | 0.0074 | + | 0.0153 | + | 0.00017 | + | 0.0091 | + | 0.0129 |

$.0581 \text{ (g/mile)} = EF_{1,1985,19.6}$

# REFERENCES

1. Carey, Penny M., Supplementary Guidelines for Lead Implementation Plans -- Updated Projections for Motor Vehicle Lead Emissions, EPA-450/2-3-002, OAR, OMS, ECTD, TSS for OAQPS, March 1983.

2. Compilation of Air Pollutant Emission Factors: Highway Mobile Sources, EPA 460/3-81-005, OAR, OMS, ECTD, TEB, March 1981.

3. Anti-Tampering and Anti-Misfueling Programs to Reduce In-Use Emissions From Motor Vehicles, EPA/AA/TSS-83-10, December 193.

4. Diesel Particulate Study (Draft), U.S. EPA, OAR, OMS, ECTD, SDSB, October 1983.

5. Lorang, Philip A., White, John T., and Brzezinski, David J., In-Use Emissions of 190 and 1981 Passenger Cars: Results of EPA Testing, SAE Paper No. 820975, U.S. Environmental Protection Agency, presented at West Coast International Meeting, San Francisco, CA, August 1982.

6. The Impact of Light-Duty Diesel Particulate Standards on the Level of Diesel Penetration in the Light-Duty Vehicle and Light-Duty Truck Markets, Jack Faucett Associates report for EPA, January 1983.

7. Assessment of Current and Projected Future Trends in Light-Duty Vehicle Fuel-Switching, Energy and Environmental Analysis, Inc., report for EPA, June 1984.

8. Draft Study of Particulate Emissions from Motor Vehicles, by the Environmental Sciences Research Laboratory (for Section 214 of the Clean Air Act), U.S. EPA, Office of Research and Development, Mobile Source Emissions Research Branch, July 1983.

9. "Control of Air Pollution from New Motor Vehicles and New Motor Vehicle Engines: Federal Certification Test Results for 1975 Model Year," Federal Register, Vol. 40, No. 48, March 11, 1975.

10. "Control of Air Pollution from New Motor Vehicles and New Motor Vehicle Engines: Federal Certification Test Results for 1976 Model Year," Federal Register, Vol. 41, No. 46, March 8, 1976.

11. "Control of Air Pollution from New Motor Vehicles and New Motor Vehicle Engines: Federal Certification Test Results for 1977 Model Year," Federal Register, Vol. 42, No. 110, June 8, 1977.

12. "Control of Air Pollution from New Motor Vehicles and New Motor Vehicle Engines: Federal Certification Test Results for 1978 Model Year," *Federal Register*, Vol. 43, No. 181, September 18, 1978.

13. *1983 Motorcycle Statistical Annual*, Motorcycle Industry Council, Inc., Research and Statistics Department, Governmental Relations Office, Arlington, VA, June 1983.

14. Hare, Charles T., *Characterization of Gaseous and Particulate Emissions from Light-Duty Diesels Operated on Various Fuels*, EPA-460/3-79-008, Southwest Research Institute, report prepared for Office of Mobile Sources, June 1979.

15. Bykowski, Bruce B., *Characterization of Diesel Emissions from Operation of a Light-Duty Diesel Vehicle on Alternate Source Diesel Fuels*, EPA-460/3-82-002, Southwest Research Institute, report prepared for Office of Mobile Sources, November 1981.

16. Bykowski, Bruce B., *Petroleum Versus Alternate-Source Fuel Effects on Light-Duty Diesel Emissions*, EPA 460/3-83-007, Southwest Research Institute, report prepared for Office of Mobile Sources, August 1983.

17. Bykowski, Bruce B., *Characterization of Diesel Emissions as a Function of Fuel Variables*, EPA-460/3-81-015, Southwest Research Institute, report prepared for Office of Mobile Sources, April 1981.

18. McCain, Joseph D., and M. Gregory Faulkner, *Assessment of Diesel Particulate Control: Particle Size Measurements*, EPA-600/7-79-232c, Southern Research Institute, report prepared for Office of Research and Development, December 1979.

19. Begeman, C.R., and P.J. Groblicki, *Particle Size Variation in Diesel Car Exhaust*, SAE Paper No. 790421, presented in Detroit, MI, February 26-March 2, 1979.

20. Carpenter, Kenneth, and John H. Johnson, *Analysis of the Physical Characteristics of Diesel Particulate Matter Using Transmission Electron Microscope Techniques*, SAE Paper No. 790815, presented in Milwaukee, WI, September 10-13, 1979.

21. Verrant, John A., and David A. Kittelson, *Sampling and Physical Characterization of Diesel Exhaust Aerosols*, SAE Paper No. 770720, presented in Detroit, MI, February 1977.

22. Ter Haar, G.L., D.L. Lanane, J.N. Hu, and M. Brandt, *Composition, Size, and Control of Automotive Exhaust Particulates*, Ethyl Corporation, report presented at the 64th Annual APCA Meeting, Atlantic City, NJ, June 27-July 1, 1971.

23. Breselin, J.A., A.J. Strazisar, and R.L. Stein, *Size Distribution and Mass Output of Particulates From Diesel Engine Exhausts*, report prepared by Pittsburg Mining and Safety Research Center, Pittsburgh, PA, U.S. Department of the Interior, Report of Investigation 8141.

24. Boyer, K.W., and H.A. Laitinen, "Automobile Exhaust Particulates," *Environ. Sci. Technol.*, *9*(5):457-469, 1975.

25. Cantwell, E.N., E.S. Jacobs, W.G. Kunz, Jr., V.E. Liberi, *Control of Particulate Lead Emissions from Automobiles*, SAE Paper No. 720672, Detroit, MI, May 1972.

26. Foster, J.F., D.A. Trayser, C.W. Melton, and R.I. Mitchell, *Chemical and Physical Characterization of Automotive Exhaust Particulate Matter in the Atmosphere*, Fourth Annual Summary Report, prepared by Battelle Columbus Laboratories, Columbus, OH, to Coordinating Research Council (CRC-APRAC Project No. CAPE-19-70) and U.S. Environmental Protection Agency (Contract No. 68-01-0279), July 1974.

27. Foster, J.F., D.A. Trayser, E.R. Blosser, F.A. Creswick, and D.F. Miller, *Chemical and Physical Characterization of Automotive Exhaust Particulate Matter in the Atmosphere*, Fifth Annual Summary Reported prepared by Battelle Columbus Laboratories, Columbus, OH, to Coordinating Research Council (CRC-APRAC Project No. CAPE-19-80), March 1974.

28. Gentel, J.E., O.J. Manary, and J.C. Valenta, *Characterization of Particulates and Other Non-regulated Emissions from Mobile Sources and the Effects of Exhaust Emissions Control Devices on these Emissions*, report prepared by The Dow Chemical Company, Midland, MI, under Contract No. EHA-70-101 to the U.S. Environmental Protection Agency, Ann Arbor, MI, March 1973.

29. Habibi, K., "Characterization of Particulate Matter in Vehicle Exhaust," *Environ. Sci. Technolo.*, *7*(3):223-234, 1973.

30. Habibi, K., E.S. Jacobs, W.G. Kunz, Jr., and D.L. Pastell, *Characterization and Control of Gaseous and Particulate Exhaust Emission from Vehicles*, paper presented to the Air Pollution Control Assn., San Francisco, CA, October 1970.

31. Hirschler, D.A., and L.F. Gilbert, "Nature of Lead in Automobile Exhaust Gas," *Arch. Environ. Health*, *9*:297-313, 1964.

32. Kittelson, D.B., D.F. Dolan, and J.A. Verrant, *Investigation of a Diesel Exhaust Aerosol*, SAE Paper No. 780109, Detroit, MI, February 1978.

33. Melton, C.W., R. Mitchell, D. Trayser, and J. Foster, Chemical and Physical Characterization of Automotive Exhaust Particulate Matter in the Atmosphere, Final Summary Report, prepared by Battelle Columbus Lab, Columbus, OH, to CRC (CRC-APRAC Project No. CAPE-19-70) and EPA (Contract No. 68-02-0205), June 1973.

34. Moran, J.B., O. Manary, R. Fay, and M. Baldwin, Development of Particulate Emission Control Techniques for Spark-Ignition Engines, Final Report, prepared by Organic Chemicals Department, The Dow Chemical Company, Midland, MI, under Contract EHS70-101, EPA, Ann Arbor, MI, July 1971.

35. Ninomiya, J.S., W. Bergman, and B.H. Simpson, Automotive Particulate Emissions, paper presented to the Second Int'l Clean Air Congress of the Int'l Union of Air Pollution Prevention Assn., Washington, D.C., December 1970.

36. Trayser, D.A., F.A. Creswick, E.R. Blosser, and D.F. Miller, Chemical and Physical Characterization of Automotive Exhaust Particulate Matter in the Atmosphere, Sixth and Final Summary Report, prepared by Battelle Columbus Laboratories, Columbus, OH, to Coordinating Research Council (CAPE-19-70), September 1976.

37. Vuk, C.T., M.A. Jones, and J.H. Johnson, The Measurement and Analysis of the Physical Character of Diesel Particulate Emissions, SAE Paper No. 760131, Detroit, MI, February 1976.

38. Duleep, K.G., Forecasts of Emission Control Technology 1983-1990, Task 5 of EPA Contract No. 68-01-6558 (Work Assignment No. 35), by Energy and Environmental Analysis, Inc., November 28, 1983.

39. Schneider, Eric W., "Detection of Leaded-Gasoline Usage in Catalyst-Equipped Vehicles: A Gamma-Ray Transmission Gauge for Measuring Catalytic Converter Lead Contamination," APCA Journal, Vol. 32, No. 5, May 1982.

40. Cha, Soyoung, Philip Carter, and Ronald L. Bradow, Simulation of Automobile Brake Wear Dynamics and Estimate of Emissions, SAE Paper No. 831036, Dearborn, MI, June 1983.

41. Cadle, S.H., and R.L. Williams, "Gas and Particle Emissions from Automobile Tires in Laboratory and Field Studies," J. Air Poll. Control Assoc., 28(5):502-507, 1978.

42. Pierson, W.R., and W.W. Brachaczek, "Airborne Particulate Debris from Rubber Tires," Rubber Chem. Technol., 47(5):1275-1229, 1974.

43. The Highway Fuel Consumption Model: Tenth Quarterly Report, prepared for the U.S. Department of Energy, by Energy and Environmental Analysis, Inc., Arlington, VA, November 1983.

44. User's Guide to MOBILE3 (Mobile Source Emissions Model), EPA 46013-84-002, June 1984.

45. Energy and Environmental Analysis, Inc., "Supplementary Guidelines for Lead Implementation Plans," prepared for the U.S. Environmental Protection Agency, August 1985.

46. Size Specific Particulate Emission Factors for Industrial and Rural Roads, draft report prepared for the Industrial Environmental Research Laboratory, U.S. EPA, EPA Contract No. 68-02-3158, by Midwest Research Institute, Kansas City, MO, June 7, 1984.

47. Paved Road Particulate Emissions -- Source Category Report, draft report prepared for the Industrial Environmental Research Laboratory, U.S. EPA, EPA Contract No. 68-02-3158, by Midwest Research Institute, Kansas City, MO, May 7, 1984.

# APPENDIX A

## TABLE A-1

## AVERAGE ANNUAL MILEAGE BY VINTAGE FOR HEAVY-DUTY TRUCKS

| Age | Class 2-B | Light HDDV | Medium HDDV | Heavy HDDV |
|---|---|---|---|---|
| 1 | 18,352 | 45,544 | 53,370 | 82,288 |
| 2 | 16,946 | 39,671 | 46,901 | 74,984 |
| 3 | 15,648 | 34,558 | 41,190 | 68,328 |
| 4 | 14,449 | 30,092 | 36,206 | 62,263 |
| 5 | 13,342 | 26,213 | 31,812 | 56,737 |
| 6 | 12,320 | 22,834 | 27,948 | 51,700 |
| 7 | 11,376 | 19,898 | 24,556 | 47,111 |
| 8 | 10,504 | 17,332 | 21,575 | 42,930 |
| 9 | 9,700 | 15,098 | 18,956 | 39,119 |
| 10 | 8,956 | 13,152 | 16,655 | 35,647 |
| 11 | 8,270 | 11,456 | 14,632 | 32,483 |
| 12 | 7,637 | 9,979 | 12,856 | 29,599 |
| 13 | 7,052 | 8,693 | 11,296 | 26,972 |
| 14 | 6,511 | 7,572 | 9,925 | 24,578 |
| 15 | 6,012 | 6,596 | 8,719 | 22,396 |
| 16 | 5,552 | 5,746 | 7,661 | 20,408 |
| 17 | 5,126 | 5,005 | 6,728 | 18,597 |
| 18 | 4,734 | 4,360 | 5,913 | 16,946 |
| 19 | 4,371 | 3,798 | 5,196 | 15,442 |
| 20+ | 4,036 | 3,308 | 4,565 | 14,071 |

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Source: MOBILE3.

## TABLE A-2

## PROJECTIONS OF HEAVY-DUTY VEHICLES IN OPERATION

| Year | Class 2-B | Light HDDV | Medium HDDV | Heavy HDDV |
|---|---|---|---|---|
| 1980 | 0.000 | 0.006 | 0.112 | 1.521 |
| 1981 | 0.000 | 0.006 | 0.124 | 1.581 |
| 1982 | 0.049 | 0.009 | 0.135 | 1.599 |
| 1983 | 0.014 | 0.013 | 0.141 | 1.592 |
| 1984 | 0.185 | 0.022 | 0.153 | 1.641 |
| 1985 | 0.274 | 0.037 | 0.166 | 1.719 |
| 1986 | 0.370 | 0.053 | 0.177 | 1.816 |
| 1987 | 0.475 | 0.071 | 0.185 | 1.927 |
| 1988 | 0.588 | 0.089 | 0.193 | 2.041 |
| 1989 | 0.707 | 0.106 | 0.201 | 2.151 |
| 1990 | 0.831 | 0.122 | 0.208 | 2.258 |
| 1991 | 0.960 | 0.137 | 0.215 | 2.362 |
| 1992 | 1.092 | 0.151 | 0.222 | 2.471 |
| 1993 | 1.225 | 0.165 | 0.229 | 2.581 |
| 1994 | 1.354 | 0.178 | 0.237 | 2.693 |
| 1995 | 1.480 | 0.190 | 0.245 | 2.807 |
| 1996 | 1.600 | 0.202 | 0.253 | 2.914 |
| 1997 | 1.712 | 0.212 | 0.261 | 3.015 |
| 1998 | 1.816 | 0.222 | 0.269 | 3.108 |
| 1999 | 1.912 | 0.230 | 0.276 | 3.194 |
| 2000 | 1.999 | 0.238 | 0.283 | 3.273 |

---

Source: MOBILE3.

APPENDIX M

# SUPPLEMENTARY GUIDELINES FOR LEAD IMPLEMENTATION PLANS

## Updated Projections for Motor Vehicle Lead Emissions

Final Report

DRAFT

EPA Contract No. 68-03-1865
Work Assignment No. 1

Prepared for:

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Mobile Source Air Pollution Control
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August 1985

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# 1. INTRODUCTION

The following material was developed to predict lead emission factors for gasoline fueled on-road vehicles and trucks at various vehicle speeds. User inputs to the equations to determine these emission factors include area travel fractions by vehicle class, vehicle miles traveled and vehicle speed. Fleet sales fractions and travel fractions by model year are included for each vehicle class. The fractions within each vehicle class that are equipped with catalysts also are provided. For the benefit of the user, an example calculation of lead emissions from light-duty vehicles is provided.

This document is an update to "Supplementary Guidelines for Lead Implementation Plans Updated Projections For Motor Vehicle Lead Emissions," U.S. EPA, EPA-450/2-83-002, Research Triangle Park, North Carolina, March 1983. This document provides updated projections for automotive lead emissions to be used by those agencies developing State Implementation Plans for lead. It has been revised to include estimates of travel fractions and fleet characterizations from the June 1984 EPA report, "User's Guide to MOBILE3 (Mobile Source Emissions Model)," EPA 460/3-84-002. It also reflects the final rulemaking recently issued by EPA which requires refiners to lower the lead content of leaded gasoline to 0.5 g/gallon on July 1, 1985 and 0.1 g/gallon by January 1, 1986 (Federal Register, Vol. 50, No. 45, March 7, 1985).

# 2. PROJECTING MOTOR VEHICLE LEAD EMISSIONS

Lead emissions from mobile sources are calculated based on the percentage of burned lead exhausted at different speeds, the lead content of gasoline, vehicle fuel economy and the model year mix of vehicles on the road. The lead content of gasoline and the model year vehicle mix are a function of the calendar year of interest. Fuel economy is averaged for all vehicles of the same model year in a given vehicle category.

## 2.1 OVERVIEW OF LEAD EMISSION CALCULATIONS

### 2.1.1 Individual Roadways or Areawide

For any given year subsequent to 1974, the total population of automobiles on the road consists of vehicles using either leaded or "nonleaded" (i.e., required to contain less than 0.05 gram/gallon lead) gasoline or diesel fuel. Diesel fuel is assumed to contain quantities of lead that are insignificant compared to gasoline fuel; therefore, only emissions from gasoline-powered vehicles are considered. The emission rate from automotive sources from an individual roadway (line source) is calculated by the following equation:

$$EF_{n,s} = \sum_{i=1}^{4} T(EF_{i,n,s}) \tag{2-1}$$

where: $EF_{n,s}$ = total lead emission factor for calendar year n and speed s (g/road mile-day)

$EF_{i,n,s}$ = lead emission factor for vehicle class i in calendar year n and vehicle speed s (g/mi)

$i$ = vehicle class designator; 1 = light-duty vehicles (LDV), 2 = light-duty trucks I (LDT1), 3 = light-duty trucks II (LDT2), and 4 = heavy-duty gas vehicles (HDGV)

$s$ = vehicle speed; avg. Federal Test Procedure (FTP) = 19.6, avg. Sulfate Emissions Test (SET) = 34.8 (miles/hr); (Note: The FTP and SET are driving cycles used for the determination of emission factors.)

$T$ = average daily traffic (vehicles/day)

To calculate the emission rate in units of grams/meter-second, $EF_{n,s}$ can be corrected by dividing by $1.39 \times 10^8$.

Equation (2-1) can be modified to calculate light-duty vehicle emissions as an area source rather than as specific line sources. The emission rate from automotive sources from an area source is calculated by the following equation:

$$EF_{n,s} = \sum_{i=1}^{4} V(EF_{i,n,s}) \qquad (2\text{-}2)$$

In equation (2-2), the term "T" was replaced by the term "V", the vehicle miles traveled in the area on a daily, monthly, or greater time basis. When VMT data are used, the emission rate, $EF_{n,s}$, will be expressed in grams per day, month, etc.

For both roadway and areawide emission calculations, the following generalized equation is used to compute emission factors for individual vehicle classes.

$$EF_{i,n,s} = \sum_{j=n-19}^{n} \left[ (EF_{i,j,n,L})(F_{L,i,j}) + (EF_{i,j,n,NL})(F_{NL,i,j}) \right] m_{i,j} \qquad (2\text{-}3)$$

where: $j$ = model year $j = n-19, n-18, \ldots, n-2, n-1, n$

$L$ = vehicles designed for use on leaded fuel

$NL$ = vehicles designed for use on unleaded fuel

$F_{L,i,j}$ = fraction of the vehicle class i fleet designed for use on leaded gasoline in model year j

$F_{NL,i,j}$ = fraction of the vehicle class i fleet designed for use on unleaded gasoline in model year j

$m_{i,j}$ = travel fraction for all gasoline vehicles in class i in model year j

In the discussion which follows, specific emission component ($EF_{i,j,n,L}$ and $EF_{i,j,n,NL}$) factor equations are presented for each vehicle category.

## 2.2 EMISSION FACTORS FOR LIGHT-DUTY VEHICLES AND LIGHT-DUTY TRUCKS I AND II

To compute emission factors for leaded vehicles ($EF_{i,j,n,L}$) use equations (2-4), (2-5), and (2-6). For unleaded vehicles ($EF_{i,j,n,NL}$) use equation (2-7).

---

LDV (Pre MY 1971) and LDT (Pre MY 1971): Leaded Fuel

---

For $i=1,2,3$ $j=n-19,\ldots 1970$ $C_s$=from Table 2-1 $a_{s1,j}=0.75$

$$EF_{i,j,n,L} = \left[Pb_{L,n}(0.887) + Pb_{NL,n}(0.113)\right] \frac{0.75}{(E_{c,i,j})(C_s)} \qquad (2\text{-}4)$$

where: $a_s$ = fraction of lead burned that is exhausted:

- for all non-catalyst vehicles and for catalyst vehicles using unleaded gasoline $a_s = 0.75$
- for catalyst vehicles using leaded gasoline in 1975-1980, $a_{s2,j} = .40$
- for catalyst vehicles using leaded gasoline in 1981 and later, $a_{s2,j} = .44$

$C_s$ = speed-dependent fuel economy correction factor based on steady cruise or cyclic driving; available from Table 2-1 (nondimensional)

$Pb_{NL,n}$ = lead content of unleaded gasoline in calendar year n from Table 2-2 (g/gal)

$Pb_{L,n}$ = average lead content of leaded gasoline in calendar year n from Table 2-2 (g/gal)

$E_{c,i,j}$ = city/highway combined on-road fuel economy for model year j and vehicle class i from Table 2-9 (miles/gallon)

### LDV (MY 1971-1974) and LDT (MY 1971): Leaded Fuel

For $i=1,2$ $\quad j=1971,\ldots,1974$ $\quad C_s$=from Table 2-1 $\quad a_{s1,j}=0.75$<br>
and For $i=3$ $\quad j=1971,\ldots,1978$

$$EF_{i,j,n,L} = \left[Pb_{L,n}(.916) + Pb_{NL,n}(0.084)\right] \frac{0.75}{(E_{c,i,j})(C_s)} \qquad (2\text{-}5)$$

### LDV (MY 1975+) and LDT (MY 1979+): Leaded Fuel

For $i=1,2$ $\quad j=1975,\ldots,n$ $\quad C_s$=from Table 2-1 $\quad a_{s1,j}=0.75$<br>
and For $i=3$ $\quad j=1979,\ldots,n$

$$EF_{i,j,n,L} = \left[Pb_{L,n}(0.724) + Pb_{NL,n}(0.276)\right] \frac{0.75}{(E_{c,i,j})(C_s)} \qquad (2\text{-}6)$$

### LDV (MY 1975+) and LDT (MY 1979+): Unleaded Fuel

For $i=1,2$ $\quad j=1975,\ldots,n$ $\quad C_s$=from Table 2-1 $\quad a_s$=from Table 2-13<br>
and For $i=3$ $\quad j=1979,\ldots,n$

$$\begin{aligned} EF_{i,j,n,NL} = \Big[ & Pb_{NL,n}(1-r_i)(a_{s1,j}) + Pb_{L,n}(r_i)\Big(F_{i,j,NL,NOCAT} \qquad (2\text{-}7) \\ & + (P_i)(F_{i,j,CAT})\Big)(a_{s1,j}) \\ & + Pb_{L,n}(r_i)(1-P_i)F_{i,j,CAT})(a_{s2,j})\Big] \frac{1}{(E_{c,i,j})(C_s)} \end{aligned}$$

where: $r_i$ = misfueling rate for vehicle class i from Table 2-12

$P_i$ = fraction of catalyst equipped vehicle in class i with their catalysts removed, from Table 2-14

$F_{i,j,CAT}$ = fraction of the unleaded vehicle class i fleet equipped with a catalyst in model year j

$F_{i,j,NL,NOCAT}$ = fraction of the unleaded vehicle class i fleet without a catalyst in model year j

Equations (2-4), (2-5), and (2-6) collectively give the g lead/vehicle-road mile emitted by light-duty non-catalyst-equipped vehicles whereas equation (2-7) gives the g lead/vehicle-road mile emitted by catalyst-equipped vehicles. It should be noted that since 1975 a small number of non-catalyst-equipped vehicles ($F_{i,j,NL,NOCAT}$ from Table 2-15) have been certified for use on unleaded gasoline. Since these vehicles constitute such a small percentage of the total non-catalyst fleet, it will be assumed that the misfueling rate for these vehicles will be the same as that for catalyst equipped vehicles. Further discussion of selected variables used in the equations follows.

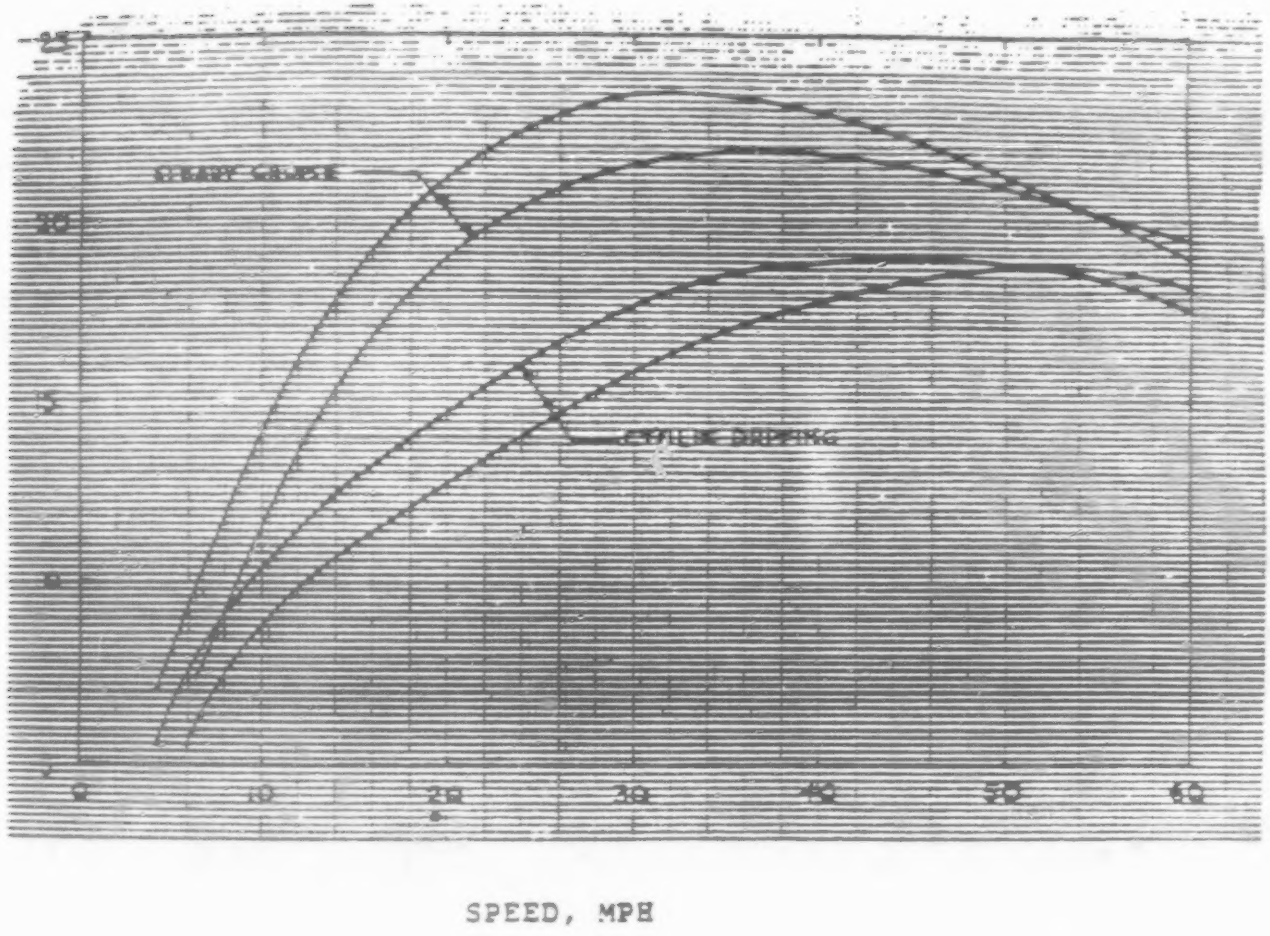
### 2.2.1 Speed Correction Factor

Figure 2-1 compares steady cruise fuel economy and generalized cyclic driving fuel economy to vehicle speed. Figure 2-1 was generated using data from 1973, 1974, and 1975 model year vehicles. Using the cyclic driving fuel economy at 32.7 miles per hour as the basis for comparison (since this speed is the average speed for the EPA combined city/highway fuel economy), fuel economy correction factors ($C_s$) for both steady cruise and cyclic driving can be calculated at various speeds. These calculations have been made and are presented in Table 2-1. Table 2-1 should be used to interpolate $C_s$ for those speeds not listed in Table 2-1. The fuel economy correction factor for cyclic driving should be used for roadways that do not have steady speed. (The determination of how much variation in speed constitutes cyclic driving is judgmental. Questionable cases should be analyzed both ways.) Likewise, the fuel economy correction factor for steady cruise driving should be used if

Figure 2-1

## FUEL ECONOMY AT VARIOUS SPEEDS*

Reproduced from best available copy.



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[*] Passenger Car Fuel Economy: **EPA and Road, September** 1980, [EPA-460/3-80-010].

free-flow, steady speed driving is indicated (e.g., along a highway at a relatively constant speed). The correction factors for cyclic and steady cruise driving become similar at high speeds as the number of stops, accelerations, and decelerations during cyclic driving decrease.

### 2.2.2 Fleet Travel and Fleet Sales Fractions

The fraction of annual travel by model year j ($m_{i,j}$) can be found in the last column of Tables 2-3, 2-5, and 2-7 for light-duty vehicles, light-duty trucks 1, and light-duty trucks II. These values for ($m_{i,j}$) are EPA's estimates of the national values. Local values should be used where available. The term, "$m_{i,j}$" accounts for all light-duty vehicles in a given model year. The travel weighting fractions were taken from EPA's Mobile Sources Inventory Model, MOBILE3. (It should be noted that the travel weighting fractions reflect a January 1 evaluation date.)

The fractions of the model year j fleet using unleaded and leaded gasoline, $F_{NL,i,j}$ and $F_{L,i,j}$, respectively, are given in Table 2-4. Values for $F_{NL,i,j}$ and $F_{L,i,j}$ account for the increasing dieselization of the light-duty vehicle fleet. Diesel-powered vehicles are assumed to emit quantities of lead that are insignificant compared to gasoline-powered vehicles; therefore, sales fractions for diesel-powered vehicles are not included. Latest sales projections for diesel-powered vehicles were derived from MOBILE3 data. Estimates of the percentages of gasoline vehicles requiring leaded and unleaded fuel were obtained from Energy and Environmental Analysis, Inc., "The Highway Fuel Consumption Model: Tenth Quarterly Report," November 1983.

### 2.2.3 Misfueling and Fuel Switching

EPA has observed that misfueling rates (i.e., percentage of vehicles designed for use on unleaded gasoline that use leaded gasoline) are dependent on vehicle mileage and increase with vehicle mileage accumulation. Strictly speaking, this dependence on mileage should be reflected in the calculation of lead emissions, with each model year receiving its own misfueling rate. However, this further complicates an already complex calculation. To give the user a choice, this report offers both the option of using a single average misfueling rate for all model years of a given vehicle class and exact misfueling rates for each vehicle class by vehicle age. The single average rates are determined for the weighted average mileage accumulated for each vehicle class and are listed in Table 2-12 for inspection and maintenance (I/M) and non-I/M areas. In other words, in the calculation of emission factors from 1975 on, the misfueling rate ($r_i$) depends only on which vehicle class (i) is being considered and whether the area of interest has an I/M program. As a result, misfueling rates and lead emissions will be slightly overestimated, with the degree of overestimation declining with later evaluation years and essentially disappearing in 1995. For users who desire more accuracy, Table 2-12a gives exact misfueling rates for different vehicle ages and classes affected by misfueling. For misfueled vehicles with their catalysts removed, the fraction ($P_i$) in Table 2-14 is applied to the fraction of vehicles with catalysts ($F_{1,j,CAT}$) in Table 2-15. These misfueling rates have been derived from the December 1983 EPA Report, Anti-Tampering and Anti-Misfueling Programs to Reduce In-Use Emissions From Motor-Vehicles, EPA-AA-TSS-83-10.

Discretionary fuel switching (i.e., percentage of vehicles designed for use on leaded gasoline that use unleaded gasoline) is assumed to equal 11.3 percent of the leaded fleet prior to 1971, and 8.4 percent from 1971 to 1974 for the LDV and LDT I categories. The discretionary rate for the LDT II class is 8.4 percent from 1971 to 1978, and 27.6 percent thereafter. For the LDV and LDT1 classes, discretionary switching is assumed to be 27.6 percent after 1974. The discretionary fuel switching rates were obtained from Energy and Environmental Analysis, Inc., Assessment of Current and Projected Trends in Light-Duty Vehicle Fuel Switching, June 1984.

The effect of discretionary fuel switching for vehicles designed for use on leaded fuel has been incorporated into equations (2-4), (2-5), and (2-6).

### 2.2.4 Fuel Economy and Fuel Lead Content

Fuel economy is yet another factor affecting lead emission levels. The city/highway combined on-road fuel economies, $E_{c,i,j}$ for model years 1970 to 1988 are given in Table 2-9. LDV fuel economy estimates were taken from an internal EPA memorandum by Karl Hellman to Ralph Stahman dated June 5, 1984. LDT fuel economies were obtained from Energy and Environmental Analysis, (EEA) Inc., "The Highway Fuel Consumption Model - Tenth Quarterly Report," November 1983. HDGV mpg estimates were drawn from an EPA memo to Mark Wolcott from Cooper Smith dated July 2, 1984.

Area lead particulate emissions also are dependent upon the lead content of gasoline in a given calendar year. Values for the lead content of leaded ($Pb_{L,n}$) and unleaded gasoline ($Pb_{NL,n}$) are contained in Table 2-2. Values for future years will be updated as new information becomes available.

### 2.2.5 Percent of Fuel Burned That is Exhausted ($a_s$)

A value for $a_s$ of 0.75 (i.e., 75 percent of the lead burned is exhausted) should be used for non-catalyst-equipped, gasoline-powered vehicles operating on leaded fuel, and for all vehicles using unleaded fuel. For gasoline powered vehicles equipped with catalysts, a value of $a_s = 0.40$ for 1975 to 1980 and $a_s = 0.44$ for 1981 and later model year vehicles that have been misfueled, should be used. The value of $a_s$ was computed from lead retention of monolithic and pelleted catalysts, respectively, and weighted for the sales mix of these catalysts in each time frame. These values of $a_s$ do not vary with speed, since $a_s$ is more correlated with driving mode, e.g., acceleration, cruise or deceleration, rather than speed alone.

## 2.3 LEAD EMISSIONS FROM OTHER GASOLINE-POWERED VEHICLES

In addition to light-duty gasoline-powered vehicles, other vehicles to consider include heavy-duty gasoline-powered trucks. (Motorcycles are assumed to emit quantities of lead that are insignificant compared to other gasoline-powered vehicles.)

Heavy-duty gasoline-powered trucks are assumed to burn leaded gasoline until 1987. It is assumed that emission standards effective in 1987 will require all new heavy-duty gasoline-powered trucks under 14,001 lbs GVW to use catalytic converters and thereby burn unleaded fuel. The emission rate for heavy-duty gasoline powered trucks prior to 1987 is calculated by using the following modification of equation (2-4):

HDGV (Pre MY 1987): Leaded Fuel

For $i=4$ $j=n-19,\ldots,1986$ $C_s$=from Table 2-1 $a_{s1,j}=0.75$

$$EF_{i,n,s} = \frac{a_{s1,j}\, Pb_{L,n}}{E_{c,i,j}\, C_s} \qquad (2\text{-}8)$$

HDGV (Post MY 1986): Leaded Fuel

For $i=4$ $j=1987,\ldots,n$ $C_s$=from Table 2-1 $a_s$=from Table 2-13

$$EF_{i,n,s} = \frac{Pb_{NL,n}\, m_{i,j}(1-r_i)(a_{s1,j})}{E_{c,4a,i}{}^{*}\,(C_s)} + \frac{Pb_{L,n}\, m_{i,j}(r_i)(a_{s2,j})}{E_{c,4b,i}{}^{**}\,(C_s)} \qquad (2\text{-}9)$$

---

*4a represents the fuel economy for HDGV1 after 1986.

**4b represents the fuel economy for HDGV2 after 1986.

Values for the variables used in equations (2-8) and (2-9) are given in the following tables/figures:

| Variable | HDGV |
|---|---|
| $a_s$ | Table 2-13 |
| $C_s$ | Table 2-1 |
| $Pb_{NL,n}$; $Pb_{L,n}$ | Table 2-2 |
| $m_{i,j}$ | Table 2-10 |
| $E_{c,i,j}$ | Table 2-9 |
| $R_i$ | Table 2-12 |

Fleet sales fractions for heavy-duty gasoline vehicles projected to 1995, are given in Table 2-11. Heavy-duty gasoline vehicles have a gross vehicle weight (GVW) rating of greater than 8,500 lbs GVW. The fleet sales fractions are decreasing with model year, reflecting the increasing dieselization of the heavy-duty fleet. These estimated fleet sales fractions can be used when projecting T, the average daily traffic (heavy-duty gasoline trucks/day), for future years.

## TABLE 2-1

## FUEL ECONOMY CORRECTION FACTORS AT VARIOUS SPEEDS, $C_s$
(Normalized to 32.7 miles/hour-cyclic driving)

| | Speed (mph) | $C_s$ Cyclic Driving | $C_s$ Steady Cruise |
|---|---|---|---|
| | 5 | 0.323 | 0.467 |
| | 10 | 0.553 | 0.709 |
| | 15 | 0.692 | 0.997 |
| (FTP) | 20 | 0.790 | 1.153 |
| | 25 | 0.885 | 1.248 |
| | 30 | 0.963 | 1.294 |
| | 32.7 | 1.000 | 1.303 |
| (SET) | 35 | 1.022 | 1.303 |
| | 40 | 1.053 | 1.288 |
| | 45 | 1.073 | 1.256 |
| | 50 | 1.078 | 1.210 |
| | 55 | 1.063 | 1.159 |
| | 60 | 1.023 | 1.104 |

## TABLE 2-2

## LEAD CONTENT OF GASOLINE

| Year | Leaded Gasoline* (g/gal) $Pb_L$ | Unleaded Gasoline (g/gal) $Pb_{NL}$ |
|---|---|---|
| 1974 | 1.79 | 0.014 |
| 1975 | 1.82 | 0.014 |
| 1976 | 2.02 | 0.014 |
| 1977 | 2.03 | 0.014 |
| 1978 | 1.94 | 0.014 |
| 1979 | 1.85 | 0.014 |
| 1980 | 1.38 | 0.014 |
| 1981 | 1.15 | 0.014 |
| 1982 | 1.24 | 0.014 |
| 1983 | 1.14 | 0.014 |
| 1984 | 1.10 | 0.014 |
| 1985 | 0.50 | 0.014 |
| 1986 | 0.10 | 0.014 |
| 1987 | 0.10 | 0.014 |
| 1988 | 0.10 | 0.014 |
| 1989 | 0.10 | 0.014 |
| 1990 | 0.10 | 0.014 |

---

*1974-1982: Lead content based upon data submitted to EPA on historical sales data for leaded gasoline and data indicating the actual pooled average lead content. The value for unleaded gasoline is based on recent MVMA fuel surveys.

1983-1990: Lead content based upon requirements for average lead content of leaded gasoline which were recently revised by EPA for 1985 and beyond and published in the Federal Register (_Federal Register_, Vol. 50, No. 45, March 7, 1985).

## TABLE 2-3

## TRAVEL WEIGHTING FACTOR CALCULATION*
## Light-Duty Vehicles

| Vehicle Age | (a) January 1 Fraction Total Registration | (b) Annual Mileage Accumulation Rate | (a)(b) | [(a)(b)/(SUM)] Fraction of LDV Travel by Model Year, $m_{1,j}$ |
|---|---|---|---|---|
| 1 | 0.028 | 12,818 | 358.9 | 0.038 |
| 2 | 0.107 | 12,639 | 1,352.4 | 0.142 |
| 3 | 0.100 | 11,933 | 1,193.3 | 0.125 |
| 4 | 0.094 | 11,268 | 1,059.2 | 0.111 |
| 5 | 0.088 | 10,639 | 936.2 | 0.098 |
| 6 | 0.080 | 10,045 | 803.6 | 0.084 |
| 7 | 0.075 | 9,485 | 711.4 | 0.075 |
| 8 | 0.069 | 8,955 | 617.9 | 0.065 |
| 9 | 0.062 | 8,455 | 524.2 | 0.055 |
| 10 | 0.056 | 7,983 | 447.0 | 0.047 |
| 11 | 0.050 | 7,538 | 376.9 | 0.040 |
| 12 | 0.043 | 7,117 | 306.0 | 0.032 |
| 13 | 0.037 | 6,720 | 248.6 | 0.026 |
| 14 | 0.031 | 6,345 | 196.7 | 0.021 |
| 15 | 0.024 | 5,991 | 143.8 | 0.015 |
| 16 | 0.018 | 5,657 | 101.8 | 0.011 |
| 17 | 0.012 | 5,341 | 64.1 | 0.007 |
| 18 | 0.008 | 4,043 | 32.3 | 0.003 |
| 19 | 0.006 | 4,762 | 28.6 | 0.003 |
| 20+ | 0.008 | 4,496 | 36.0 | 0.004 |
|  |  | SUM: | 9,538.9 |  |

---

*Data derived from MOBILE3.

## TABLE 2-4

## FLEET SALES FRACTIONS
## Light-Duty Vehicles*

| Model Years | Nonleaded Gasoline Fraction of LDV Fleet, $F_{NL,1,j}$** | Leaded Gasoline Fraction of LDV Fleet, $F_{L,1,j}$ |
|---|---|---|
| Pre-1975 | 0.000 | 1.000 |
| 1975 | 0.869 | 0.128 |
| 1976 | 0.863 | 0.134 |
| 1977 | 0.838 | 0.158 |
| 1978 | 0.865 | 0.126 |
| 1979 | 0.875 | 0.097 |
| 1980 | 0.966 | 0.000 |
| 1981 | 0.939 | 0.000 |
| 1982 | 0.954 | 0.000 |
| 1983 | 0.947 | 0.000 |
| 1984 | 0.940 | 0.000 |
| 1985 | 0.934 | 0.000 |
| 1986 | 0.927 | 0.000 |
| 1987 | 0.920 | 0.000 |
| 1988 | 0.910 | 0.000 |
| 1989 | 0.900 | 0.000 |
| 1990 | 0.887 | 0.000 |
| 1991 | 0.887 | 0.000 |
| 1992 | 0.886 | 0.000 |
| 1993 | 0.886 | 0.000 |
| 1994 | 0.885 | 0.000 |
| 1995+ | 0.885 | 0.000 |

Where $F_{NL,1}$ = Estimated fraction of the LDV model year fleet which use nonleaded gasoline

$F_{L,1}$ = Estimated fraction of the LDV model year fleet which use leaded gasoline

---

*Percentages of gasoline vehicles requiring leaded and nonleaded fuel obtained from EPA Certification Data Base.

**Diesel and gasoline sales projections were derived from MOBILE3.

## TABLE 2-5

## TRAVEL WEIGHTING FACTOR CALCULATION*
### Light-Duty Gas Trucks I**

| Vehicle Age | (a) January 1 Fraction Total Registration | (b) Annual Mileage Accumulation Rate | (a)(b) | [(a)(b)/(SUM)] Fraction of LDV Travel by Model Year, $m_{2,i}$ |
|---|---|---|---|---|
| 1 | 0.023 | 17,394 | 400.1 | 0.036 |
| 2 | 0.089 | 17,079 | 1,520.0 | 0.135 |
| 3 | 0.085 | 15,839 | 1,346.3 | 0.120 |
| 4 | 0.081 | 14,690 | 1,189.9 | 0.106 |
| 5 | 0.076 | 13,624 | 1,035.4 | 0.092 |
| 6 | 0.072 | 12,636 | 909.8 | 0.081 |
| 7 | 0.068 | 11,719 | 796.9 | 0.071 |
| 8 | 0.064 | 10,868 | 695.6 | 0.062 |
| 9 | 0.060 | 10,080 | 604.8 | 0.054 |
| 10 | 0.055 | 9,348 | 514.1 | 0.046 |
| 11 | 0.050 | 8,670 | 433.5 | 0.039 |
| 12 | 0.046 | 8,041 | 369.9 | 0.033 |
| 13 | 0.042 | 7,457 | 313.2 | 0.028 |
| 14 | 0.038 | 6,916 | 262.8 | 0.023 |
| 15 | 0.034 | 6,415 | 218.1 | 0.019 |
| 16 | 0.029 | 5,949 | 172.5 | 0.015 |
| 17 | 0.025 | 5,517 | 137.9 | 0.012 |
| 18 | 0.021 | 5,117 | 107.5 | 0.009 |
| 19 | 0.017 | 4,746 | 80.7 | 0.007 |
| 20 | 0.025 | 4,402 | 110.1 | 0.010 |
|  |  | SUM: | 11,219.1 |  |

---

*Data derived from MOBILE3.

**Light-duty trucks I have a gross vehicle weight (GVW) rating of 6,000 pounds or less.

## TABLE 2-6

## FLEET SALES FRACTIONS
## Light-Duty Trucks I*

| Model Years | Unleaded Gasoline Fraction of LDT1 Fleet, $F_{NL,2}$** | Leaded Gasoline Fraction of LDT1 Fleet, $F_{L,2}$ |
|---|---|---|
| Pre-1975 | 0.000 | 1.000 |
| 1975 | 0.810 | 0.188 |
| 1976 | 0.909 | 0.088 |
| 1977 | 0.957 | 0.038 |
| 1978 | 0.964 | 0.027 |
| 1979 | 0.942 | 0.030 |
| 1980 | 0.945 | 0.021 |
| 1981 | 0.914 | 0.026 |
| 1982 | 0.899 | 0.021 |
| 1983 | 0.878 | 0.022 |
| 1984 | 0.870 | 0.000 |
| 1985 | 0.840 | 0.000 |
| 1986 | 0.820 | 0.000 |
| 1987 | 0.790 | 0.000 |
| 1988 | 0.760 | 0.000 |
| 1989 | 0.730 | 0.000 |
| 1990 | 0.706 | 0.000 |
| 1991 | 0.697 | 0.000 |
| 1992 | 0.688 | 0.000 |
| 1993 | 0.679 | 0.000 |
| 1994 | 0.670 | 0.000 |
| 1995+ | 0.661 | 0.000 |

Where $F_{NL,2}$ = Estimated fraction of the LDT1 model year fleet which use nonleaded gasoline.

$F_{L,2}$ = Estimated fraction of the LDT1 model year fleet which use leaded gasoline.

---

*Percentages of gasoline vehicles requiring leaded and unleaded fuel obtained from Energy and Environmental Analysis, Inc., "The Highway Fuel Consumption Model: Tenth Quarterly Report," November 1983.

**Diesel and gasoline sales projections were derived from MOBILE3.

## TABLE 2-7

## TRAVEL WEIGHTING FACTOR CALCULATION*
## Light-Duty Gas Trucks II**

| Vehicle Age | (a) January 1 Fraction Total Registration | (b) Annual Mileage Accumulation Rate | (a)(b) | [(a)(b)/(SUM)] Fraction of LDT2 Travel by Model Year, $m_{3,j}$ |
|---|---|---|---|---|
| 1 | 0.023 | 18,352 | 422.1 | 0.036 |
| 2 | 0.089 | 18,001 | 1,602.1 | 0.138 |
| 3 | 0.085 | 16,622 | 1,412.9 | 0.122 |
| 4 | 0.081 | 15,348 | 1,243.2 | 0.107 |
| 5 | 0.076 | 14,172 | 1,077.1 | 0.093 |
| 6 | 0.072 | 13,087 | 942.3 | 0.081 |
| 7 | 0.068 | 12,084 | 821.7 | 0.071 |
| 8 | 0.064 | 11,158 | 714.1 | 0.062 |
| 9 | 0.060 | 10,303 | 618.2 | 0.053 |
| 10 | 0.055 | 9,514 | 523.3 | 0.045 |
| 11 | 0.050 | 8,785 | 439.3 | 0.038 |
| 12 | 0.046 | 8,112 | 373.2 | 0.032 |
| 13 | 0.042 | 7,491 | 314.6 | 0.027 |
| 14 | 0.038 | 6,917 | 262.8 | 0.023 |
| 15 | 0.034 | 6,386 | 217.1 | 0.019 |
| 16 | 0.029 | 5,897 | 171.0 | 0.015 |
| 17 | 0.025 | 5,446 | 136.2 | 0.012 |
| 18 | 0.021 | 5,028 | 105.6 | 0.009 |
| 19 | 0.017 | 4,643 | 78.9 | 0.007 |
| 20+ | 0.025 | 4,287 | 107.2 | 0.009 |
|  |  | SUM: | 11,582.9 |  |

---

*Data derived from MOBILE3.

**Light-duty trucks II have a gross vehicle weight (GVW) rating of 6,001 to 8,500 pounds.

## TABLE 2-8

## FLEET SALES FRACTIONS
## Light-Duty Trucks II*

| Model Years | Unleaded Gasoline Fraction of LDT2 Fleet, $F_{NL,3}$** | Leaded Gasoline Fraction of LDT2 Fleet, $F_{L,3}$ |
|---|---|---|
| Pre-1975 | 0.000 | 1.000 |
| 1975 | 0.000 | 0.998 |
| 1976 | 0.000 | 0.997 |
| 1977 | 0.000 | 0.995 |
| 1978 | 0.000 | 0.991 |
| 1979 | 0.972 | 0.000 |
| 1980 | 0.966 | 0.000 |
| 1981 | 0.940 | 0.000 |
| 1982 | 0.920 | 0.000 |
| 1983 | 0.900 | 0.000 |
| 1984 | 0.870 | 0.000 |
| 1985 | 0.840 | 0.000 |
| 1986 | 0.820 | 0.000 |
| 1987 | 0.790 | 0.000 |
| 1988 | 0.760 | 0.000 |
| 1989 | 0.730 | 0.000 |
| 1990 | 0.706 | 0.000 |
| 1991 | 0.697 | 0.000 |
| 1992 | 0.688 | 0.000 |
| 1993 | 0.679 | 0.000 |
| 1994 | 0.670 | 0.000 |
| 1995+ | 0.661 | 0.000 |

WHERE $F_{NL,3}$ = Estimated fraction of the LDT2 model year fleet which use nonleaded gasoline.

$F_{L,3}$ = Estimated fraction of the LDT2 model year fleet which use leaded gasoline.

---

*Percentages of gasoline vehicles requiring leaded and nonleaded fuel obtained from Energy and Environmental Analysis, Inc., "The Highway Fuel Consumption Model: Tenth Quarterly Report," November 1983.

**Diesel and gasoline sales projections were derived from MOBILE3.

# TABLE 2-9

## CITY/HIGHWAY COMBINED ON-ROAD FUEL ECONOMY
(miles/gallon)

| Model | Fuel Economy, $E_{c,i,j}$ | | | | | |
|---|---|---|---|---|---|---|
| Year | LDV* | LDT1** | LDT2 | HDGV1+ | HDGV2 | HDGV++ |
| Pre-1970 | 13.9 | 10.6 | 7.9 | - | - | 6.5 |
| 1970 | 13.9 | 10.6 | 7.9 | - | - | 6.4 |
| 1971 | 13.2 | 10.4 | 7.7 | - | - | 6.4 |
| 1972 | 13.1 | 10.2 | 7.4 | - | - | 6.4 |
| 1973 | 12.9 | 9.9 | 7.0 | - | - | 6.5 |
| 1974 | 12.6 | 9.6 | 6.9 | - | - | 6.7 |
| 1975 | 13.5 | 11.6 | 8.8 | - | - | 6.8 |
| 1976 | 14.8 | 12.3 | 9.7 | - | - | 7.3 |
| 1977 | 15.5 | 13.0 | 9.4 | - | - | 7.7 |
| 1978 | 16.8 | 13.4 | 9.6 | - | - | 8.0 |
| 1979 | 17.2 | 14.2 | 9.8 | - | - | 8.2 |
| 1980 | 20.0 | 16.1 | 11.5 | - | - | 8.4 |
| 1981 | 21.4 | 17.7 | 13.3 | - | - | 8.6 |
| 1982 | 22.2 | 18.6 | 13.6 | - | - | 8.8 |
| 1983 | 22.2 | 19.2 | 13.7 | - | - | 8.9 |
| 1984 | 22.8 | 19.9 | 13.9 | - | - | 8.9 |
| 1985 | 23.2 | 20.7 | 14.0 | - | - | 9.0 |
| 1986 | 23.8 | 21.4 | 14.3 | - | - | 9.0 |
| 1987 | 24.3 | 23.0 | 14.5 | 9.5 | 5.6 | 9.0 |
| 1988 | 24.8 | 23.3 | 14.7 | 9.5 | 5.6 | 9.1 |
| 1989 | 25.2 | 23.1 | 14.9 | 9.6 | 5.6 | 9.2 |
| 1990 | 25.7 | 24.0 | 15.2 | 9.7 | 5.6 | 9.2 |
| 1991 | 26.2 | 24.5 | 15.4 | 9.7 | 5.7 | 9.3 |
| 1992 | 26.6 | 24.4 | 15.7 | 9.8 | 5.7 | 9.4 |
| 1993 | 27.2 | 25.3 | 15.9 | 9.8 | 5.7 | 9.4 |
| 1994 | 27.6 | 25.8 | 16.2 | 9.9 | 5.7 | 9.5 |
| 1995 and later | 29.0 | 26.2 | 16.4 | 10.1 | 5.8 | 9.6 |

---

*Fuel economies for LDV's from MOBILE3 data based on EPA memo from Karl H. Hellman to Ralph C. Stahman regarding Light-Duty MPG, June 15, 1984.

**Fuel economies for LDT's drawn from the input data used to generate "The Highway Fuel Consumption Model: Tenth Quarterly Report." prepared by Energy and Environmental Analysis, Inc.

+Fuel economies for Heavy-duty gasoline vehicles (HDGV) were derived from figure presented in an EPA memo to Mark Wolcott from Cooper Smith, dated July 2, 1984.

++Pre-1986 fuel economies are composites of HDGV1 and HDGV2.

# TABLE 2-10

## TRAVEL WEIGHTING FACTOR CALCULATION*
## Heavy-Duty Gasoline Vehicle (HDGV)**

| Vehicle Age | (a) January 1 Fraction Total Registration | (b) Annual Mileage Accumulation Rate | (a)(b) | [(a)(b)/(SUM)] Fraction of HDGT Travel by Model Year, $m_{4,j}$ |
|---|---|---|---|---|
| 1 | 0.000 | 0 | 0.0 | 0.000 |
| 2 | 0.148 | 19,967 | 2,955.1 | 0.227 |
| 3 | 0.126 | 18,077 | 2,277.7 | 0.175 |
| 4 | 0.107 | 16,365 | 1,751.1 | 0.134 |
| 5 | 0.092 | 14,815 | 1,363.0 | 0.105 |
| 6 | 0.078 | 13,413 | 1,046.2 | 0.080 |
| 7 | 0.067 | 12,143 | 813.6 | 0.062 |
| 8 | 0.058 | 10,993 | 637.6 | 0.049 |
| 9 | 0.049 | 9,952 | 487.6 | 0.037 |
| 10 | 0.041 | 9,010 | 369.4 | 0.028 |
| 11 | 0.036 | 8,156 | 293.6 | 0.023 |
| 12 | 0.030 | 7,384 | 221.5 | 0.017 |
| 13 | 0.026 | 6,685 | 173.8 | 0.013 |
| 14 | 0.022 | 6,052 | 133.1 | 0.010 |
| 15 | 0.020 | 5,479 | 121.0 | 0.009 |
| 16 | 0.016 | 4,960 | 79.4 | 0.006 |
| 17 | 0.014 | 4,490 | 62.9 | 0.005 |
| 18 | 0.012 | 4,065 | 48.8 | 0.004 |
| 19 | 0.010 | 3,680 | 36.8 | 0.003 |
| 20+ | 0.049 | 3,332 | 163.3 | 0.013 |
|  |  | SUM: | 13,035.5 |  |

---

*Data derived from MOBILE3.

**Heavy-duty gasoline vehicles have a gross vehicle weight (GVW) rating greater than 8,500 pounds.

## TABLE 2-11

## FLEET SALES FRACTIONS
## Heavy-Duty Gasoline Vehicles (HDGV)*

| Model Years | Unleaded Fraction of HDGV Fleet $F_{L,4,j}$** | Leaded Fraction of HDGV Fleet $F_{L,4,j}$** |
|---|---|---|
| Pre-1977 | 0.000 | 1.000 |
| 1977 | 0.000 | 1.000 |
| 1978 | 0.000 | 1.000 |
| 1979 | 0.000 | 1.000 |
| 1980 | 0.000 | 1.000 |
| 1981 | 0.000 | 1.000 |
| 1982 | 0.000 | 1.000 |
| 1983 | 0.000 | 1.000 |
| 1984 | 0.000 | 1.000 |
| 1985 | 0.000 | 1.000 |
| 1986 | 0.000 | 1.000 |
| 1987 | 0.823 | 0.177 |
| 1988 | 0.824 | 0.176 |
| 1989 | 0.825 | 0.175 |
| 1990 | 0.826 | 0.174 |
| 1991 | 0.828 | 0.172 |
| 1992 | 0.829 | 0.171 |
| 1993 | 0.833 | 0.167 |
| 1994 | 0.837 | 0.163 |
| 1995 | 0.840 | 0.159 |

---

*Heavy-duty gasoline vehicles have a gross vehicle weight (GVW) rating greater than 8,500 pounds.

**The estimated fractions of the HDGV model year fleets which are unleaded are based on figures from "Historical and Projected Emissions Conversion Factor and Fuel Economy for Heavy-Duty Trucks 1962-2002," prepared for MVMA by Energy and Environmental Analysis, Inc., December 1983. These estimates are consistent with the data presented in "Heavy-Duty Vehicle Emission Conversion Factors: 1962-1997 prepared by M.C. Smith IV, U.S. Environmental Protection Agency, August, 1984.

### TABLE 2-12

### RATES OF MISFUELING ($r_i$) FOR DIFFERENT VEHICLE CLASSES*

| | I/M | Non-I/M |
|---|---|---|
| Light-Duty Vehicles (i=1) | 0.09 | 0.20 |
| Light-Duty Trucks I (i=2) | 0.20 | 0.46 |
| Light-Duty Trucks II (i=3) | 0.21 | 0.47 |
| Heavy-Duty Gasoline Vehicles I (i=4)** | 0.19 | 0.40 |

---

*Values in this table are expressed as fractions of the total number of vehicles in each class. Misfueling rates are determined for the weighted average mileage accumulated for each vehicle class.

**Misfueling rates for Heavy-Duty Gasoline Vehicles pertain only to those trucks made after model year 1986.

SOURCES: The equations used to estimate misfueling as a function of mileage for I/M and non-I/M areas are drawn from "Anti-Tampering and Anti-Misfueling Programs to Reduce In-Use Emissions from Motor Vehicles," EPA-AA-TSS-83-10, Office of Mobile Sources, December 31, 1983.

Weighted average mileages by vehicle category are calculated from data contained in MOBILE3.

## TABLE 2-12a

## RATES OF MISFUELING ($r_i$) FOR DIFFERENT VEHICLE AGES AND CLASSES*

| Vehicle Age | LDV | | LDTI | | LDTII | | HDGV1 ** | |
|---|---|---|---|---|---|---|---|---|
| | Non-I/M | I/M | Non-I/M | I/M | Non-I/M | I/M | Non-I/M | I/M |
| 1 | .04 | .04 | .22 | .13 | .23 | .13 | .18 | .12 |
| 2 | .07 | .05 | .27 | .14 | .27 | .15 | .23 | .13 |
| 3 | .10 | .06 | .31 | .16 | .32 | .16 | .28 | .15 |
| 4 | .13 | .07 | .35 | .17 | .36 | .17 | .32 | .16 |
| 5 | .16 | .08 | .38 | .18 | .39 | .18 | .36 | .17 |
| 6 | .18 | .09 | .42 | .19 | .43 | .19 | .39 | .18 |
| 7 | .21 | .09 | .45 | .20 | .46 | .20 | .42 | .19 |
| 8 | .23 | .10 | .47 | .21 | .49 | .21 | .45 | .20 |
| 9 | .25 | .11 | .50 | .21 | .51 | .22 | .48 | .21 |
| 10 | .27 | .11 | .52 | .22 | .54 | .23 | .50 | .22 |
| 11 | .29 | .12 | .55 | .23 | .56 | .23 | .52 | .22 |
| 12 | .31 | .12 | .57 | .24 | .58 | .24 | .54 | .23 |
| 13 | .33 | .13 | .59 | .24 | .60 | .25 | .56 | .23 |
| 14 | .34 | .13 | .60 | .25 | .62 | .25 | .57 | .24 |
| 15 | .36 | .14 | .62 | .25 | .63 | .26 | .59 | .24 |
| 16 | .37 | .14 | .64 | .26 | .65 | .26 | .60 | .25 |
| 17 | .39 | .15 | .65 | .26 | .66 | .26 | .61 | .25 |
| 18 | .40 | .15 | .66 | .26 | .68 | .27 | .62 | .25 |
| 19 | .41 | .15 | .68 | .27 | .69 | .27 | .63 | .25 |
| 20+ | .42 | .16 | .69 | .27 | .70 | .28 | .64 | .26 |

---

*Values in this table are expressed as fractions of the total number of vehicles in each class. Misfueling rates are determined for the average mileage in each class. Misfueling rates are determined for the average mileage accumulated by each vehicle class of each vehicle age group.

**Misfueling rates for Heavy-Duty Gasoline Vehicles 1 (HDGV1) are estimates for 1987 and later calendar years. Currently all HDGV1s use leaded fuel. (For example, for the year 1990, use the first three values in either the non-I/M or I/M HDGV1 column. All HDGV1s greater than 3 years old in this case (i.e., pre-1987 vehicles) would have a misfueling rate of zero since they do not require use of unleaded fuel.

SOURCES: The equations used to estimate misfueling as a function of mileage for I/M and non-I/M areas are drawn from "Anti-Tampering and Anti-Misfueling Programs to Reduce In-Use Emissions from Motor Vehicles," EPA-AA-TSS-83-10, Office of Mobile Sources, December 31, 1983.

Weighted average mileages by vehicle category are calculated from data contained in MOBILE3.

## TABLE 2-13

## FRACTION OF LEAD BURNED THAT IS EXHAUSTED, $a_s$

| | $a_{s1,j}$* | | $a_{s2,j}$** |
|---|---|---|---|
| All years | .75 | 1975-1980 | .40 |
| | | 1981+ | .44 |

---

*$a_{s1,j}$ is used for all vehicles using unleaded gasoline and for vehicles without catalysts using leaded gasoline.

**$a_{s2,j}$ is used for catalyst equipped vehicles using leaded gasoline.

## TABLE 2-14

## FRACTION OF CATALYST EQUIPPED VEHICLES WITH CATALYST REMOVED, $P_1$*

|  | $P_1$ | $P_2$ and $P_3$ |
|---|---|---|
| I/M | .017 | .050 |
| Non-I/M | .045 | .195 |

---

*Fractions obtained from "Anti-Tampering and Anti-Misfueling Programs to Reduce In-Use Emissions From Motor Vehicles," U.S. EPA, December 1983.

TABLE 2-15

FRACTION OF CATALYST AND NON-CATALYST VEHICLES BUILT TO USE UNLEADED FUEL

| | LDV | | LDTI | | LDTII | |
|---|---|---|---|---|---|---|
| | $F_{1,i,CAT}$ | $F_{1,i,NL,NOCAT}$ | $F_{2,i,CAT}$ | $F_{2,i,NL,NOCAT}$ | $F_{3,i,CAT}$ | $F_{3,i,NL,NOCAT}$ |
| 1975 | 0.919 | 0.081 | 0.877 | 0.123 | - | - |
| 1976 | 0.980 | 0.020 | 0.775 | 0.225 | - | - |
| 1977 | 1.000 | - | 0.917 | 0.083 | - | - |
| 1978 | 1.000 | - | 0.930 | 0.069 | - | - |
| 1979 | 1.000 | - | 0.966 | 0.034 | 0.992 | 0.008 |
| 1980 | 1.000 | - | 0.973 | 0.027 | 1.000 | - |
| 1981 | 1.000 | - | 0.989 | 0.011 | 1.000 | - |
| 1982 | 1.000 | - | 1.000 | - | 1.000 | - |
| 1983 | 1.000 | - | 1.000 | - | 1.000 | - |
| 1984 | 1.000 | - | 1.000 | - | 1.000 | - |
| 1985 | 1.000 | - | 1.000 | - | 1.000 | - |
| 1986 | 1.000 | - | 1.000 | - | 1.000 | - |
| 1987 | 1.000 | - | 1.000 | - | 1.000 | - |
| 1988+ | 1.000 | - | 1.000 | - | 1.000 | - |

---

Sources: U.S. EPA Federal Register: Federal Certification Test Results 1975-78 and 1982-84.
EEA Estimates of Emission Control Systems Projections.

## 3. EXAMPLE CALCULATION OF LIGHT-DUTY VEHICLE LEAD EMISSIONS

### PROBLEM

For an area characterized by light-duty vehicles driving under cyclic conditions with an average speed of 19.6 miles per hour, calculate the areawide lead emission rate for the year 1985. Assume an inspection and maintenance program has been implemented in this area. The simplified misfueling rates from Table 2-12 will be used.

### SOLUTION

Use equations (2-4), (2-5), (2-6), and (2-7) to plug into equation (2-3) to get emission factors by vehicle class. Use individual class factors to plug into equation (2-2) for total areawide lead emissions in 1985.

$T1,1985 = 1.0$

$n = 1985$

$i = 1 =$ LDV

$s = 19.6$ mph

$Pb_{L,1985} = 1.1$ g/gal (Table 2-2)

$Pb_{NL,1985} = 0.014$ g/gal (Table 2-2)

$a_{s1,1966-1985} = 0.75$ (Table 2-13)

$a_{s2,1975-1980} = 0.40$ (Table 2-13)

$a_{s2,1981-1985} = 0.44$ (Table 2-13)

$C_s = 0.79$ (Table 2-1)

$P_1 = 0.017$ (Table 2-14)

$r_1 = 0.09$ (Table 2-12)

$$EF_{n,s} = \sum_{i=1}^{4} T\,(EF_{i,n,s}) \tag{3-1}$$

$$EF_{1,1985,19.6} = \sum_{j=1966}^{1985} \left[ (EF_{1,j,1985,L}) \times (F_{L,1,j}) + (EF_{1,j,1985,NL}) \times (F_{NL,1,j}) \right] \times m_{1,j} \tag{3-2}$$

Use the following equations to plug into equation (3-2) and sum over the appropriate model years.

For j=1966-1970

$$EF_{1,j,1985,L} = \left(1.1(0.887) + 0.014(0.113)\right) \times \frac{.75}{E_{c,1,j}^{(0.79)}} = \frac{.928}{E_{c,1,j}} \tag{3-3}$$

For j=1971-1974

$$EF_{1,j,1985,L} = \left(1.1(0.916) + 0.014(0.084)\right) \times \frac{.75}{E_{c,i}^{(0.79)}} = \frac{.958}{E_{c,i}} \tag{3-4}$$

For j=1975-1985

$$EF_{1,j,1985,L} = \left(1.1(0.724) + 0.014(0.276)\right) \times \frac{.75}{E_{c,1,j}^{(0.79)}} = \frac{.776}{E_{c,1,j}} \tag{3-5}$$

For j=1975-1985

$$EF_{1,j,1985,NL} = \Big[0.014(0.91)(0.75) + 1.1(0.09)(F_{1,j,NL,NOCAT} + (0.017)(F_{1,j,CAT})(0.75) + 1.1(0.09)(0.983)(F_{1,j,CAT})(a_{s,1,j})\Big] \tag{3-6}$$

$$x \frac{1}{E_{c,1,j}(0.79)} = \frac{X_{1,j}}{E_{c,1,j}}$$

| | $X,_{1,j}$ |
|---|---|
| 1975 | .0665 |
| 1976 | .06389 |
| 1977 | .06303 |
| 1978 | .06303 |
| 1979 | .06303 |
| 1980 | .06303 |
| 1981 | .06795 |
| 1982 | .06795 |
| 1983 | .06795 |
| 1984 | .06795 |
| 1985 | .06795 |

Plugging the appropriate values into equation (3-1), we arrive at the values shown in Section C of Table 3-1. Adding summation (1) and summation (2) we get: $EF_{1,85,19.6} = 0.0132$ (g/mi).

Note: This example is an estimate of lead emissions from light-duty vehicles only. Therefore, the total emission rate from all vehicle classes for an area in calendar year 1985 can be expected to be considerably higher.

## TABLE 3-1

### EXAMPLE CALCULATIONS
### LIGHT-DUTY VEHICLE PARTICULATE EMISSION RATE LESS THAN 10 MICRONS FOR THE YEAR 1985

### A. Emission Factor Component Calculation Inputs

| Model Year$_j$ | Age | $m_{1,j}$ | $F_{NL,1,j}$ | $F_{L,1,j}$ | $E_{c,1,j}$ | $F_{1,j,CAT}$ | $F_{1,j,NL,NOCAT}$ | $\frac{(F_{NL,1,j})(m_{1,j})}{E_{c1,j}}$ | $\frac{(F_{L,1,j})(m_{1,j})}{E_{c1,j}}$ |
|---|---|---|---|---|---|---|---|---|---|
| 1985 | 1 | 0.038 | 0.934 | - | 24.6 | 1.000 | - | .00144 | - |
| 1984 | 2 | 0.142 | 0.940 | - | 23.8 | 1.000 | - | .00561 | - |
| 1983 | 3 | 0.125 | 0.947 | - | 23.2 | 1.000 | - | .00510 | - |
| 1982 | 4 | 0.111 | 0.954 | - | 22.9 | 1.000 | - | .00462 | - |
| 1981 | 5 | 0.098 | 0.939 | - | 21.5 | 1.000 | - | .00428 | - |
| 1980 | 6 | 0.084 | 0.966 | 0.000 | 19.6 | 1.000 | - | .00414 | - |
| 1979 | 7 | 0.075 | 0.875 | 0.097 | 17.8 | 1.000 | - | .00369 | .00041 |
| 1978 | 8 | 0.065 | 0.865 | 0.126 | 16.6 | 1.000 | - | .00339 | .00049 |
| 1977 | 9 | 0.055 | 0.838 | 0.158 | 15.5 | 1.000 | - | .00297 | .00056 |
| 1976 | 10 | 0.047 | 0.863 | 0.134 | 14.8 | 0.980 | 0.020 | .00274 | .00043 |
| 1975 | 11 | 0.040 | 0.869 | 0.128 | 13.8 | 0.919 | 0.081 | .00252 | .00037 |
| 1974 | 12 | 0.032 | - | 1.000 | 12.6 | - | - | - | .00254 |
| 1973 | 13 | 0.026 | - | 1.000 | 12.9 | - | - | - | .00202 |
| 1972 | 14 | 0.021 | - | 1.000 | 13.1 | - | - | - | .00160 |
| 1971 | 15 | 0.015 | - | 1.000 | 13.2 | - | - | - | .00114 |
| 1970 | 16 | 0.011 | - | 1.000 | 13.9 | - | - | - | .00079 |
| 1969 | 17 | 0.007 | - | 1.000 | 13.9 | - | - | - | .00050 |
| 1968 | 18 | 0.003 | - | 1.000 | 13.9 | - | - | - | .00022 |
| 1967 | 19 | 0.003 | - | 1.000 | 13.9 | - | - | - | .00022 |
| 1966- | 20+ | 0.004 | - | 1,000 | 13.9 | - | - | - | .00029 |

TABLE 3-1

EXAMPLE CALCULATIONS
LIGHT-DUTY VEHICLE PARTICULATE EMISSION RATE
LESS THAN 10 MICRONS FOR THE YEAR 1985 (cont'd)

### B. Emission Factor Summation Description

Summation (1) calculates the emission factor component in Equations (3-2), (3-3), and (3-4) that are used in Equation (3-1).

Summation (2) calculates the emission factor component in Equation (3-5) that is used in Equation (3-1).

TABLE 3-1

EXAMPLE CALCULATIONS
LIGHT-DUTY VEHICLE PARTICULATE EMISSION RATE
LESS THAN 10 MICRONS FOR THE YEAR 1985 (cont'd)

C. Emission Factor Calculations

| | 1 | 2 |
|---|---|---|
| Year, $j$ | $(EF_{1,j,1985,L})$ $(F_{L,1,j})(m_{1,j})$ | $(EF_{1,j,1985,NL})$ $(F_{NL,1,j})(m_{1,j})$ |
| 1985 | - | 0.0001 |
| 1984 | - | 0.0004 |
| 1983 | - | 0.0003 |
| 1982 | - | 0.0003 |
| 1981 | - | 0.0003 |
| 1980 | - | 0.0003 |
| 1979 | 0.0003 | 0.0002 |
| 1978 | 0.0004 | 0.0002 |
| 1977 | 0.0004 | 0.0002 |
| 1976 | 0.0003 | 0.0002 |
| 1975 | 0.0003 | 0.0002 |
| 1974 | 0.0024 | - |
| 1973 | 0.0019 | - |
| 1972 | 0.0015 | - |
| 1971 | 0.0011 | - |
| 1970 | 0.0007 | - |
| 1969 | 0.0005 | - |
| 1968 | 0.0002 | - |
| 1967 | 0.0002 | - |
| 1966- | 0.0003 | - |
| SUM: | 0.0105 | 0.0027 |

$EF_{1,1985,19.6} = 0.0132$ (g/mi)

# APPENDIX N

## DIESEL POWERED TRANSIT BUSES

### INTRODUCTION

This appendix presents an alternative methodology for calculating emission factors for full-size diesel powered transit buses. Because of the similarities between buses and trucks in terms of inertia weight and engine type, EPA combines buses and trucks in the heavy duty vehicle class. Chapter 7 describes the standard procedure for determining emission factors for diesel powered heavy duty vehicles. Both the certification and emission factor test procedures for bus engines involve the use of the EPA engine transient test which is described in Chapter 7. The resultant engine emission data can then be converted to gram per mile values through the use of conversion factors as discussed in the EPA report "Heavy Duty Vehicle Emission Conversion Factors, 1962-1997," EPA-AA-SDSB-84-1. This has been the standard methodology for calculating transit bus emission factors in previous AP-42 documents and can continue to be used if desired.

Based on recent research and analysis, EPA believes that the application of the standard heavy-duty vehicle emission factor methodology for diesel powered transit buses is not completely accurate. Because transit buses operate exclusively in urban areas, typically on the most populated corridors, and emit pollution at ground level, public exposure to transit bus emissions is relatively high and EPA has begun to analyze the issue in greater depth. EPA has recently completed two test programs to identify the actual emissions from in-use transit buses. These programs involved buses which were temporarily removed from operating service and which were tested as-is (i.e., without additional maintenance) in their chassis configurations over test cycles designed specifically to simulate transit bus operation. The gram per mile emission factors obtained directly from these chassis test programs differ significantly from the emission factors which would be calculated indirectly from engine test data and conversion factors.

It must be stressed that EPA's analysis of transit bus emissions is ongoing. The data base currently includes just 2 bus engine designs and a total of 7 transit buses. Transit bus emissions can be affected by many parameters such as engine type, design, age, and state of maintenance; vehicle size and transmission; type of test cycle utilized; whether No. 1 diesel fuel or No. 2 diesel fuel is used; etc. EPA is not now able to identify the exact contributions of the various parameters to the overall emission factor offsets, but is continuing to investigate these relationships. Despite the limited data base, EPA believes that, for buses, in-use chassis emissions data provide a more accurate estimate of actual emission factors than does the general heavy-duty methodology based on engine emission data and conversion factors. EPA will update AP-42 as more information becomes available on this issue.

## TEST PROCEDURES

The EPA heavy-duty engine transient test procedure is used for certification purposes as well as for general emissions testing. This involves operating an engine over a test cycle that consists of engine speed and load transients. There are two primary issues with respect to the representativeness of the EPA engine transient test in characterizing transit bus emissions. One, recent analysis shows that generating emission factors from engine data and conversion factors is not as straightforward for transit buses as it is for heavy-duty trucks. This has encouraged EPA to utilize bus chassis emission testing which generates gram per mile values directly. Two, since the design of the EPA engine transient test was based on truck operation, it does not represent typical transit bus operation. Transit buses are known for their low average speed, stop-and-go operation and high acceleration and deceleration rates.

Accordingly, in recent transit bus test programs EPA has utilized two chassis test cycles which simulate transit bus operation: 1) an EPA bus driving cycle generated at the same time and from a similar data base as the official certification engine test, and 2) the central business district phase of the SAE Type II Fuel Consumption Test Procedure for buses. Both of these are chassis transient cycles with low average speeds and high acceleration rates. Both cycles have yielded dynamometer fuel economies which are very near to in-use fuel economies, and EPA believes that these cycles yield emissions which are representative of actual emissions.

## EMISSIONS

There are many different diesel engines which have been utilized in transit buses, but two engines designed and built by Detroit Diesel Allison (DDA) Division of General Motors have dominated the transit bus market. Until recently the standard bus engine was the DDA 71-series engine, typified by the DDA 6V-71N, a naturally-aspirated, two-stroke, six-cylinder diesel engine, and its eight-cylinder counterpart, the DDA 8V-71N. It has been estimated that the 71-series engines are installed in over 80 percent of the transit buses currently operating in the U.S. Recently, the 71-series engines have been replaced in most new bus applications by the DDA 6V-92TA, a turbocharged, two-stroke, six-cylinder diesel with lower fuel consumption and emissions. EPA bus testing programs have focused on these two engine designs and the first two subsections will give emission factors for exhaust hydrocarbons, carbon monoxide, nitrogen oxide, and particulate matter from buses equipped with these two engines. The third subsection will give guidance for buses with engines other than DDA designs.

As discussed in Chapter 7, diesel powered heavy duty vehicles are considered to have insignificant crankcase and evaporative hydrocarbon emissions and thus no such emission factors are given. It is not possible at this time to disaggregate transit bus emission factors into zero mile emission levels and emission deterioration rates as is done throughout the rest of AP-42. This is because of the limited transit bus data base as well as the complications due to the fact that transit bus engines are typically rebuilt 2 or 3 times during the lifetime of the bus. The best indicator of expected emissions deterioration is engine mileage since the last rebuild rather than total bus mileage. Accordingly, aggregate emission factors are given below, for each major pollutant from individual engine designs, which EPA believes are representative of the average emissions from transit buses over their lifetimes. Finally, there are no speed or temperature correction factors available at this time for transit bus emissions.

## Buses with DDA 71-Series Engines

EPA's Office of Research and Development has performed emission testing of four buses with 71-series engines as part of a larger overall test program described in the EPA report "Characterization of Heavy-Duty Motor Vehicle Emissions Under Transient Driving Conditions," (full report, dated October 1984, available as NTIS PB85-124154; project summary, dated December 1984, EPA-600/S3-84-104). All four buses are GMC RTS II buses and are part of the San Antonio, Texas transit fleet. Three of the engines were sold in 1980 and the fourth was sold in 1978. The engines had accumulated between 137,000 and 247,000 miles prior to testing. Each of the buses was tested two times over the EPA bus cycle as received, without maintenance being performed, with No. 1 diesel fuel. No idle testing was performed. Table N-1 gives the average emissions for these four buses equipped with DDA 71-series engines.

## Buses with DDA 6V-92TA Engines

EPA's Office of Mobile Sources has tested three buses with 6V-92TA engines as one task of a contract described in the EPA report "Emissions Characterization of Heavy-Duty Diesel and Gasoline Engines and Vehicles" (EPA 460/3-85-001, March 1985). All three buses are GMC RTS II buses and were tested as received from the Houston, Texas bus fleet. Two of the engines were sold in 1983 while the third had been produced in 1982. Engine mileage ranged from 55,000 to 139,000 miles. Two of the buses were tested with No. 1 diesel fuel, while the third bus utilized No. 2 diesel fuel. One bus was tested twice over the EPA bus cycle only, the second bus was tested twice over both the EPA bus cycle and the SAE central business district cycle, and the third bus was tested once over both cycles. Emissions data for both the EPA and SAE cycles were similar and have been aggregated for the latter two buses, while only EPA bus cycle data are available for the first bus. Hot stabilized idle tests were performed on each bus with the transmission in drive and the air conditioning off. It should be noted that both the EPA bus and SAE central business district cycles include a fraction of time at idle. Thus, the idle emission factors need only be used in situations where idle is the only operating mode. Table N-1 gives the average emissions for these three buses equipped with DDA 6V-92TA engines.

### Buses with Other Engines

EPA has no bus chassis data on full-size buses with engines other than the DDA 71-series and 6V-92TA engines. The EPA recommendation is to use an average of the emission factors for the 71-series and 6V-92TA engines. These average values are also shown in Table N-1.

## SAMPLE CALCULATION

Given the transit bus emission factors in Table N-1, the only other data needed to calculate aggregate annual transit bus emissions are a breakdown of the engines used in a particular transit fleet and associated annual mileage accumulation. According to the American Public Transit Association, there were 62,000 transit buses in the U.S. in 1982 which traveled approximately 1.67 billion miles. Thus, on average, transit buses accumulate 27,000 miles per year. In reality, newer buses typically have higher annual mileages while older buses, some of which are only used as substitutes, usually accumulate fewer miles. Annual vehicle miles traveled data are available from individual transit authorities.

As an example, assume that an urban area has a transit fleet of 500 buses and that 300 of the buses utilize DDA 71-series engines and accumulate on average 25,000 miles per year, 100 of the buses utilize DDA 6V-92TA engines and average 35,000 miles per year, and the remaining 100 buses utilize other engines and average 28,000 miles per year. The total annual particulate emission loading from these buses, based on the emission factors in Table N-1, would be (300 x 25,000 x 6.27) + (100 x 35,000 x 4.77) + (100 x 28,000 x 5.52) = 79,200,000 grams per year or 87.2 standard tons per year.

Table N-1

## Diesel Powered Transit Bus Emission Factors
(grams per mile, except for idle)

| Bus Engines | HC | CO | NOx | PM |
|---|---|---|---|---|
| DDA 6V-71N, 8V-71N | 3.59 | 77.5 | 24.4 | 6.27 |
| DDA 6V-92TA | 3.10 | 26.2 | 27.7 | 4.77 |
| Other engines(average) | 3.35 | 51.9 | 26.1 | 5.52 |
| All engines at idle (grams per minute) | 0.46 | 0.40 | 2.84 | 0.10 |

## Part II - OFF-HIGHWAY MOBILE SOURCES

### INTRODUCTION

This section contains emission rates for eight types of off-highway mobile sources. The emissions of six of these types of sources are unchanged from the previous edition and supplements. Changes have been made inboard powered vessels and diesel powered heavy-duty construction equipment. The changes for these two sources are summarized below.

Inboard Powered Vessels - Only one item has been changed since the previous edition. This change was the deletion of the 1550 horsepower diesel emission factors from Table II-3.3 because they were for a 1550 horsepower steam engine and not a diesel engine.

Construction Equipment - The emission factors for heavy-duty diesel construction equipment are based on a recent study by Environmental Research and Technology, Inc. Some of the categories of construction equipment have changed. The emission factors for heavy-duty gas powered construction equipment are the same as in the previous edition.

Comments on Other Studies - Recently there have been two studies undertaken for off-highway mobile sources. The first one deals strictly with inboard powered vessels, and is entitled "Emission Factor Documentation for AP-42: Section 3.2.3 Inboard Powered Vessels" (EPA 450/4-84-001). The second report discusses locomotives, construction equipment and inboard powered vessels, and is entitled "Recommended Revisions to Gaseous Emission Factors for Several Classes of Off-Highway Vehicles - Final Report" (EPA 460/3-85-004, March 1985). The following are EPA's comments on material presented in these reports relative to AP-42.

Locomotives - The current emission factors for locomotives are based on tests of three in-use locomotives. The second report located data on at least fifteen new locomotives, and recommended updating the emissions to this new data set. The report also suggested that the duty cycle for locomotives include some engine shut-down in place of some engine idle, mostly based on the fact that fuel costs are higher and companies would encourage engine shut-down as a cost saving measure. The previous emission factors do not assume any engine shut-down during the duty cycle. EPA has not adopted the new emission factors, and instead has retained the previous emission factors for two reasons. First, there does not appear to be any verifiable basis for picking the percent of engine shut-down time during the duty cycle. Second, EPA has become aware of a larger data set of in-use locomotives with emission data. EPA intends to analyze these data in the near future, and feels it would be inappropriate to update the locomotive emission factors with the fifteen locomotives on an interim basis, only to change them at a later date.

Inboard Powered Vessels - The first report compiled available data on inboard powered vessels and attempted to estimate the emission factors.

The second report critiqued the first report, and found some inconsistencies in the manner in which the emission factors were estimated. The second report recommended only two changes to the existing emission factors -- one was the removal of the 1550 horsepower emission rates from Table II-3.3. (This engine was a steam boiler, and not diesel powered as presented.) This we have done. The second was the addition of some new emission rates for diesel engines above 3000 horsepower, but at only one load setting and in units which were inconsistent with those in Table II-3.2. EPA investigated the possibility of converting the new data into the old units but had no basis for estimating the appropriate conversion factor. Therefore, the previous emission factors (at 3600 horsepower) are retained.

Future Work - Beside locomotives, EPA may also soon undertake a study of emissions from new aircraft. Emission standards for new aircraft took effect in 1984; therefore, all 1984 and newer aircraft should have lower emissions than the rates presented herein. However, the present emission rates for aircraft are sufficient for now, since the majority of aircraft in use are pre-1984 uncontrolled technology.

## II-1 AIRCRAFT

### II-1.1 General

Aircraft engines are of two major categories, reciprocating piston and gas turbine.

In the piston engine, the basic element is the combustion chamber, or cylinder, in which mixtures of fuel and air are burned and from which energy is extracted by a piston and crank mechanism driving a propeller. The majority of aircraft piston engines have two or more cylinders and are generally classified according to their cylinder arrangement - either "opposed" or "radial". Opposed engines are installed in most light or utility aircraft, and radial engines are used mainly in large transport aircraft. Almost no singlerow inline or V-engines are used in current aircraft.

The gas turbine engine usually consists of a compressor, a combustion chamber and a turbine. Air entering the forward end of the engine is compressed and then heated by burning fuel in the combustion chamber. The major portion of the energy in the heated air stream is used for aircraft propulsion. Part of the energy is expended in driving the turbine, which in turn drives the compressor. Turbofan and turboprop (or turboshaft) engines use energy from the turbine for propulsion, and turbojet engines use only the expanding exhaust stream for propulsion. The terms "propjet" and "fanjet" are sometimes used for turboprop and turbofan, respectively.

The aircraft in the following tables include only those believed to be significant at present or over the next few years.

Few piston engine aircraft data appear here. Military fixed wing piston aircraft, even trainers, are being phased out. One piston engine helicopter, the TH-55A "Osage", sees extensive use at one training base at Ft. Rucker, AL (EPA Region IV), but engine emissions data are not available. Most civil piston engine aircraft are in general aviation service.

The fact that a particular aircraft brand is not listed in the following tables does not mean the emission factors cannot be calculated. It is the engine emissions and the time-in-mode (TIM) category which determine emissions. If these are known, emission factors can be calculated in the same way that the following tables are developed.

The civil and military aircraft classification system used is shown in Tables II- 1-1 and II- 1-2. Aircraft have been classified by kind of aircraft and the most commonly used engine for that kind. Jumbo jets normally have a maximum of about 40,000 pounds thrust per engine, and medium range jets about 14,000 pounds thrust per engine. Small piston engines develop less than 500 horsepower.

### II- 1.2 The Landing/Takeoff Cycle and Times-in-Mode

A landing/takeoff (LTO) cycle incorporates all of the normal flight and ground operation modes (at their respective times-in-mode), including: descent/approach from approximately 3000 feet (915 m) above ground level (AGL), touchdown, landing run, taxi in, idle and shutdown, startup and idle, checkout, taxi out, takeoff, and climbout to 3000 feet (915m) AGL.

In order to make the available data manageable, and to facilitate comparisons, all of these operations are conventionally grouped into five standard modes: approach, taxi/idle in, taxi/idle out, takeoff and climbout. There are exceptions. The supersonic transport (SST) has a descent mode preceding approach. Helicopters omit the takeoff mode. Training exercises involve "touch and go" practice. These omit the taxi/idle modes, and the maximum altitude reached is much lower. Hence, the duration (TIM) of the approach and climbout modes will be shorter.

Each class of aircraft has its own typical LTO cycle (set of TIMs). For major classes of aircraft, these are shown in Tables II- 1-3 and II- 1-4. The TIM data appearing in these tables should be used for guidance only and in the absence of specific observations. The military data are inappropriate to primary training. The civil data apply to large, congested fields at times of heavy activity.

All of the data assume a 3000 foot AGL inversion height and an average U.S. mixing depth. This may be inappropriate at specific localities and times, for which specific site and time inversion height data should be sought. Aircraft emissions of concern here are those released to the atmosphere below the inversion. If local conditions suggest higher or lower inversions, the duration (TIM) of the approach and climbout modes must be adjusted correspondingly.

A more detailed discussion of the assumptions and limitations implicit in these data appears in Reference 1.

Emission factors in Tables II- 1-9 and II- 1-10 were determined using the times-in-mode presented in Tables II- 1-3 and II- 1-4, and generally for the engine power settings given in Tables II- 1-5 and II- 1-6.

## Table II-1-1. CIVIL AIRCRAFT CLASSIFICATION[a]

| Aircraft | Engine[b] | | | |
|---|---|---|---|---|
| | No. | Mfg. | Type | Model/Series |
| Supersonic transport | | | | |
| BAC/Aerospatiale Concorde | 4 | RR | TF | Olymp. 593-610 |
| Short, medium, long range and jumbo jets | | | | |
| BAC 111-400 | 2 | RR | TF | Spey 511 |
| Boeing 707-320B | 4 | P&W | TF | JT3D-7 |
| Boeing 727-200 | 3 | P&W | TF | JT8D-17 |
| Boeing 737-200 | 2 | P&W | TF | JT8D-17 |
| Boeing 747-200B | 4 | P&W | TF | JT9D-7 |
| Boeing 747-200B | 4 | P&W | TF | JT9D-70 |
| Boeing 747-200B | 4 | RR | TF | RB211-524 |
| Lockheed L1011-200 | 3 | RR | TF | RB211-524 |
| Lockheed L1011-100 | 3 | RR | TF | RB211-22B |
| McDonnell-Douglas DC8-63 | 4 | P&W | TF | JT3D-7 |
| McDonnell-Douglas DC9-50 | 2 | P&W | TF | JT8D-17 |
| McDonnell-Douglas DC10-30 | 3 | GE | TF | CF6-50C |
| Air carrier turboprops - commuter, feeder line and freighters | | | | |
| Beech 99 | 2 | PWC | TP | PT6A-28 |
| GD/Convair 580 | 2 | All | TP | 501 |
| DeHavilland Twin Otter | 2 | PWC | TP | PT6A-27 |
| Fairchild F27 and FH227 | 2 | RR | TP | R. Da. 7 |
| Grumman Goose | 2 | PWC | TP | PT6A-27 |
| Lockheed L188 Electra | 4 | All | TP | 501 |
| Lockhead L100 Hercules | 4 | All | TP | 501 |
| Swearingen Metro-2 | 2 | GA | TP | TPE 331-3 |
| Business jets | | | | |
| Cessna Citation | 2 | P&W | TF | JT15D-1 |
| Dassault Falcon 20 | 2 | GE | TF | CF700-2D |
| Gates Learjet 24D | 2 | GE | TJ | CJ610-6 |
| Gates Learjet 35, 36 | 2 | GE | TF | TPE 731-2 |
| Rockwell International Shoreliner 75A | 2 | GE | TF | CF 700 |
| Business turboprops (EPA Class P2) | | | | |
| Beech B99 Airliner | 2 | PWC | TP | PT6A-27 |
| DeHavilland Twin Otter | 2 | PWC | TP | PT6A-27 |
| Shorts Skyvan-3 | 2 | GA | TP | TPE-331-2 |
| Swearingen Merlin IIIA | 2 | GA | TP | TPE-331-3 |
| General aviation piston (EPA Class P1) | | | | |
| Cessna 150 | 1 | Con | O | 0-200 |
| Piper Warrior | 1 | Lyc | O | 0-320 |
| Cessna Pressurized Skymaster | 2 | Con | O | TS10-360C |
| Piper Navajo Chieftain | 2 | Lyn | O | T10-540 |

[a] References 1 and 2.

[b] Abbreviations: TJ - tubojet, TF - turbofan, TP - turboprop, R - reciprocating piston, O - opposed piston. All - Detroit Diesel Allison Division of General Motors, Con - Teledyne/Continental, GA - Garrett AiResearch, GE - General Electric, Lyc - Avco/Lycoming, P&W - Pratt & Whitney, PWC - Pratt & Whitney Aircraft of Canada, RR - Rolls Royce.

## Table II-1-2. MILITARY AIRCRAFT CLASSIFICATION[a]

| Aircraft mission (Class) | DOD Designation | Popular name | Manufacturer[b] | Service | Power plant No. & Type[c] | | Power plant Mfg.[b] | Power plant Designation |
|---|---|---|---|---|---|---|---|---|
| Combat | A-4 | Skyhawk | McD-Doug | USN, USMC | 1 | TJ | P&W | J52, J65 |
| | A-7 | Corsair 2 | Vought | USN | 1 | TF | All, P&W | TF41, TF30 |
| | F-4 | Phantom 2 | McD-Doug | USAF, USN | 2 | TJ | GE | J79 |
| | F-5 | Freedom Fighter/ Tiger 2 | Northrop | USAF | 2 | TJ | GE | J85 |
| | F-14 | Tomcat | Grumman | USN | 2 | TF | P&W | TF30, F401 |
| | F-15A | Eagle | McD-Doug | USAF | 2 | TF | P&W | F100 |
| | F-16 | - | GD/FW | USAF | 1 | TF | P&W | F100 |
| Bomber | B-52 | Stratofortress | Boeing | USAF | 8 | TJ, TF | P&W | J57, TF33 |
| Transport Patrol/Antisub | C-5A | Galaxy | GELAC | USAF | 4 | TF | GE | TF39 |
| | C-130 | Hercules | GELAC | USAF, USN, USCG | 4 | TP | All | T56 |
| | KC-135 | Stratotanker | Boeing | USAF | 4 | TJ | P&W | J57 |
| | C-141 | Starlifter | GELAC | USAF | 4 | TF | P&W | TF33 |
| | P-3C | Orion | CALAC | USN | 4 | TP | All | T56 |
| | S-3A | Viking | CALAC | USN | 2 | TF | GE | TF34 |
| Trainer | T-34C | Turbo Mentor | Beech | USN | 1 | TP | PWC | PT6A |
| | T-38 | Talon | Northrop | USAF | 2 | TJ | GE | J85 |
| Helicopter | UH-1H | Iroquois/Huey | Bell | USA, USN | 1 | TS | Lyc, GE | T53, T58 |
| | HH-3 | Sea King/Jolly Green Giant | Sikorsky | USAF, USN, USCG | 2 | TS | GE | T58 |
| | CH-47 | Chinook | Boeing Vertol | USA | 2 | TS | Lyc | T55 |

[a] Reference 1. USN - U.S. Navy, USMC - U.S. Marine Corps, USAF - U.S. Air Force, USCG - U.S. Coast Guard, USA - U.S. Army.

[b] Abbreviations: All - Detroit Diesel Allison Division of General Motors, CALAC - Lockheed - California, GD/FW - General Dynamics, Ft. Worth, GE - General Electric, GELAC - Lockheed-Georgia, Lyc - Lycoming, McD-Doug - McDonnell Douglas, P&W - Pratt & Whitney, PWC - Pratt & Whitney Aircraft of Canada.

[c] TJ - Turbojet, TF - Turbofan, TP - Turboprop, TS - Turboshaft.

Table II-1-3. TYPICAL DURATION FOR CIVIL LTO CYCLES AT LARGE CONGESTED METROPOLITAN AIRPORTS[a]

| Aircraft | Mode | | | | | |
|---|---|---|---|---|---|---|
| | Taxi/ Idle out | Takeoff | Climbout | Approach | Taxi/ Idle in | Total |
| Commercial carrier | | | | | | |
| Jumbo, long and medium range jet[b] | 19.0 | 0.7 | 2.2 | 4.0 | 7.0 | 32.9 |
| Turboprop[c] | 19.0 | 0.5 | 2.5 | 4.5 | 7.0 | 33.5 |
| Transport-piston | 6.5 | 0.6 | 5.0 | 4.6 | 6.5 | 23.2 |
| General aviation | | | | | | |
| Business jet | 6.5 | 0.4 | 0.5 | 1.6 | 6.5 | 15.5 |
| Turboprop[c] | 19.0 | 0.5 | 2.5 | 4.5 | 7.0 | 33.5 |
| Piston[d] | 12.0 | 0.3 | 5.0 | 6.0 | 4.0 | 27.3 |
| Helicopter | 3.5 | - | 6.5 | 6.5 | 3.5 | 20.0 |

[a] Reference 3. Data given in minutes.
[b] Same times as EPA Classes T2, T3 and T4 (Note b, Table II-1-5).
[c] Same times as EPA Classes T1 and P2 (Note b, Table II-1-5).
[d] Same times as EPA Class P1 (Note b, Table II-1-5).

Table II-1-4. TYPICAL DURATION FOR MILITARY LTO CYCLES[a]

| Aircraft | TIM[b] Code | Mode |  |  |  |  |  |
|---|---|---|---|---|---|---|---|
|  |  | Taxi/ Idle out | Takeoff | Climbout | Approach | Taxi/ Idle in | Total |
| Combat[c] |  |  |  |  |  |  |  |
| USAF | 1 | 18.5 | 0.4 | 0.8 | 3.5 | 11.3 | 34.5 |
| USN[d] | 2 | 6.5 | 0.4 | 0.5 | 1.6 | 6.5 | 15.5 |
| Trainer - Turbine |  |  |  |  |  |  |  |
| USAF T-38 | 3 | 12.8 | 0.4 | 0.9 | 3.8 | 6.4 | 24.3 |
| USAF general | 4 | 6.8 | 0.5 | 1.4 | 4.0 | 4.4 | 17.1 |
| USN[d] | 2 | 6.5 | 0.4 | 0.5 | 1.6 | 6.5 | 15.5 |
| Transport - Turbine[e] |  |  |  |  |  |  |  |
| USAF general | 5 | 9.2 | 0.4 | 1.2 | 5.1 | 6.7 | 22.6 |
| USN[f] | 6 | 19.0 | 0.5 | 2.5 | 4.5 | 7.0 | 33.5 |
| USAF B-52 and KC-135 | 7 | 32.8 | 0.7 | 1.6 | 5.2 | 14.9 | 55.2 |
| Military - Piston | 8 | 6.5 | 0.6 | 5.0 | 4.6 | 6.5 | 23.2 |
| Military - Helicopter | 9 | 8.0 | - | 6.8 | 6.8 | 7.0 | 28.6 |

[a] Reference 1. Data given in minutes. USAF - U.S. Air Force, USN - U.S. Navy.

[b] TIM Code defined in Table II-1-5.

[c] Fighters and attack craft only.

[d] Time-in-mode is highly variable. Taxi/idle out and in times as high as 25 and 17 minutes, respectively, have been noted. Use local data base if possible.

[e] Includes all turbine craft not specified elsewhere (i.e., transport, cargo, observation, patrol, antisubmarine, early warning, and utility).

[f] Same as EPA Class P2 for civil turboprops.

Table II-1-5. ENGINE POWER SETTINGS FOR TYPICAL EPA LTO COMMERCIAL CYCLES[a]

| Mode | Power setting (% thrust or horsepower) | | | |
|---|---|---|---|---|
| | Class T1, P2[b] | Class T2,T3, T4[b] | Class P1[b] | Helicopter |
| Taxi/Idle (out) | Idle | Idle | Idle | Undefined |
| Takeoff | 100 | 100 | 100 | |
| Climbout | 90 | 85 | 75 - 100 | |
| Approach | 30 | 30 | 40 | |
| Taxi/Idle (in) | Idle | Idle | Idle | |

[a] References 1 and 3.

[b] As defined by EPA (Reference 3):

Class T1 is all aircraft turbofan or turbojet engines except Class T5 of rated power less than 8000 lbs thrust.

Class T2 is all turbofan or turbojet aircraft engines except Classes T3, T4 and T5 of rated power of 8000 lbs thrust or greater.

Class T3 is all aircraft gas turbine engines of the JT3D model family.

Class T4 is all aircraft gas turbine engines of the JT8D model family.

Class T5 is all aircraft gas turbine engines on aircraft designed to operate at supersonic speeds.

Class P1 is all aircraft piston engines, except radial.

Class P2 is all aircraft turboprop engines.

Table II-1-6. ENGINE POWER SETTINGS FOR A TYPICAL LTO MILITARY CYCLE[a]

| Mode | Power setting (% thrust or horsepower) | | | |
|---|---|---|---|---|
| | Military transport | Military jet | Military piston | Military helicopter |
| Taxi/Idle (out) | Idle | Idle | 5 - 10 | Idle |
| Takeoff | Military | Military or Afterburner | 100 | - |
| Climbout | 90 - 100 | Military | 75 | 60 - 75 |
| Approach | 30 | 84 - 86 | 30 | 45 - 50 |
| Taxi/Idle (in) | Idle | Idle | 5 - 10 | Idle |

[a] Reference 1.

## TABLE II-1-7. MODAL EMISSION RATES–CIVIL AIRCRAFT ENGINES[a]

| Model-Series<br>Mfg[b] Type[b] | Mode | Fuel Rate |  | CO |  | $NO_x$[c] |  | Total HC[d] |  | $SO_x$[e] |  | Particulates[f] |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr |
| 250B17B<br>All. TP | Idle | 63 | 28.58 | 6.13 | 2.78 | 0.09 | 0.041 | 1.27 | 0.576 | 0.06 | 0.03 |  |  |
|  | Takeoff | 265 | 120.2 | 2.07 | 0.939 | 1.75 | 0.794 | 0.07 | 0.032 | 0.27 | 0.12 |  |  |
|  | Climbout | 245 | 111.1 | 2.21 | 1.00 | 1.46 | 0.662 | 0.09 | 0.041 | 0.25 | 0.11 |  |  |
|  | Approach | 85 | 38.56 | 4.13 | 1.87 | 0.19 | 0.086 | 0.44 | 0.200 | 0.09 | 0.04 |  |  |
| 501D22A<br>All. TP | Idle | 610 | 276.7 | 26.60 | 12.07 | 2.15 | 0.975 | 10.74 | 4.87 | 0.61 | 0.28 |  |  |
|  | Takeoff | 2376 | 1078 | 4.85 | 2.20 | 21.10 | 9.57 | 0.67 | 0.304 | 2.38 | 1.08 |  |  |
|  | Climbout | 2198 | 997 | 4.53 | 2.05 | 20.27 | 9.19 | 1.96 | 0.889 | 2.20 | 1.00 |  |  |
|  | Approach | 1140 | 517.1 | 5.81 | 2.64 | 8.54 | 3.87 | 2.23 | 1.01 | 1.14 | 0.52 |  |  |
| TPE 331-3<br>GA TP | Idle | 112.0 | 50.8 | 6.89 | 3.12 | 0.320 | 0.145 | 8.86 | 4.02 | 0.11 | 0.05 | 0.3[g] | 0.14[g] |
|  | Takeoff | 458.0 | 207.7 | 0.350 | 0.159 | 5.66 | 2.57 | 0.050 | 0.023 | 0.46 | 0.21 | 0.8 | 0.36 |
|  | Climbout | 409.0 | 185.5 | 0.400 | 0.181 | 4.85 | 2.20 | 0.060 | 0.027 | 0.41 | 0.19 | 0.6 | 0.27 |
|  | Approach | 250.0 | 113.4 | 1.74 | 0.789 | 2.48 | 1.12 | 0.160 | 0.073 | 0.25 | 0.11 | 0.6 | 0.27 |
| TPE331-2<br>GA TP | Idle | 105.0 | 47.6 | 6.73 | 3.05 | 0.27 | 0.22 | 9.58 | 4.34 | 0.11 | 0.05 | (Assume 331-3 data) |  |
|  | Takeoff | 405.0 | 183.7 | 0.38 | 0.172 | 4.14 | 1.88 | 0.16 | 0.072 | 0.41 | 0.18 |  |  |
|  | Climbout | 372.0 | 168.7 | 0.51 | 0.231 | 3.69 | 1.67 | 0.15 | 0.068 | 0.37 | 0.17 |  |  |
|  | Approach | 220.0 | 99.8 | 3.65 | 1.66 | 1.82 | 0.826 | 0.59 | 0.268 | 0.22 | 0.10 |  |  |
| TPE 731-2<br>GA TF | Idle | 181.0 | 82.1 | 11.11 | 5.04 | 0.54 | 0.245 | 4.05 | 1.84 | 0.18 | 0.08 |  |  |
|  | Takeoff | 1552.0 | 704.0 | 1.86 | 0.844 | 29.8 | 13.52 | 0.14 | 0.064 | 1.55 | 0.70 |  |  |
|  | Climbout | 1385.0 | 628.2 | 1.80 | 0.816 | 23.68 | 10.74 | 0.12 | 0.054 | 1.39 | 0.63 |  |  |
|  | Approach | 521.0 | 236.3 | 9.53 | 4.32 | 3.59 | 1.63 | 1.51 | 0.685 | 0.52 | 0.24 |  |  |
| CJ 610-2C<br>GE TJ | Idle | 510.0 | 231.3 | 79.05 | 35.86 | 0.46 | 0.209 | 9.18 | 4.16 | 0.51 | 0.23 |  |  |
|  | Takeoff | 2780.0 | 1261.0 | 75.06 | 34.05 | 11.68 | 5.30 | 0.28 | 0.127 | 2.78 | 1.26 |  |  |
|  | Climbout | 2430.0 | 1102.0 | 65.61 | 29.76 | 8.99 | 4.08 | 0.49 | 0.222 | 2.43 | 1.10 |  |  |
|  | Approach | 1025.0 | 464.9 | 90.20 | 40.91 | 1.54 | 0.698 | 2.77 | 1.26 | 1.03 | 0.46 |  |  |
| CF700-2D<br>GE TF | Idle | 460 | 208.7 | 71.30 | 32.34 | 0.41 | 0.186 | 8.28 | 3.76 | 0.46 | 0.21 |  |  |
|  | Takeoff | 2607 | 1182 | 57.35 | 26.01 | 14.60 | 6.62 | 0.26 | 0.118 | 2.61 | 1.18 |  |  |
|  | Climbout | 2322 | 1053 | 58.05 | 26.33 | 9.98 | 4.53 | 0.23 | 0.104 | 2.32 | 1.05 |  |  |
|  | Approach | 919 | 416.9 | 56.98 | 25.85 | 1.65 | 0.748 | 1.29 | 0.585 | 0.92 | 0.42 |  |  |
| CF6-6D<br>GE TF | Idle | 1063 | 482.2 | 65.06 | 29.51 | 4.88 | 2.21 | 21.79 | 9.88 | 1.06 | 0.48 | 0.04[g] | 0.02[g] |
|  | Takeoff | 13750 | 6237 | 8.25 | 3.74 | 467.5 | 212.1 | 8.25 | 3.74 | 13.75 | 6.24 | 0.54 | 0.24 |
|  | Climbout | 11329 | 5139 | 6.80 | 3.03 | 309.2 | 140.2 | 6.80 | 3.08 | 11.33 | 5.14 | 0.54 | 0.24 |
|  | Approach | 3864 | 1753 | 23.18 | 10.51 | 41.54 | 18.84 | 6.96 | 3.16 | 3.86 | 1.75 | 0.44 | 0.20 |
| CF6-50C<br>GE TF | Idle | 1206 | 547 | 88.04 | 39.93 | 3.02 | 1.37 | 36.18 | 16.41 | 1.21 | 0.55 | (Assume CF6-6D data) |  |
|  | Takeoff | 18900 | 8573 | 0.38 | 0.172 | 670.95 | 304.3 | 0.19 | 0.086 | 18.90 | 8.57 |  |  |
|  | Climbout | 15622 | 7104 | 4.70 | 2.13 | 462.0 | 209.6 | 0.16 | 0.073 | 15.62 | 7.10 |  |  |
|  | Approach | 5280 | 2395 | 22.70 | 10.30 | 52.8 | 23.95 | 0.05 | 0.023 | 5.28 | 2.40 |  |  |

## TABLE II-1-7 (CONTINUED)

| Model-Series<br>Mfg.[b] Type[b] | Mode | Fuel Rate |  | CO |  | $NO_x$[c] |  | Total HC[d] |  | $SO_x$[e] |  | Particulates[f] |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr |
| JT3D-7 | Idle | 1013 | 459.5 | 140.8 | 63.87 | 2.23 | 1.01 | 124.6 | 56.52 | 1.01 | 0.46 | 0.45[g] | 0.20[g] |
| P&W TF | Takeoff | 9956 | 4516 | 8.96 | 4.06 | 126.4 | 57.34 | 4.98 | 2.26 | 9.96 | 4.52 | 8.25 | 3.7 |
|  | Climbout | 8188 | 3714 | 15.56 | 7.06 | 78.6 | 35.65 | 3.28 | 1.49 | 8.19 | 3.71 | 8.5 | 3.9 |
|  | Approach | 3084 | 1399 | 60.14 | 27.28 | 16.35 | 7.42 | 6.46 | 2.94 | 3.08 | 1.40 | 8.0 | 3.6 |
| JT8D-17 | Idle | 1150 | 521.6 | 39.10 | 17.74 | 3.91 | 1.77 | 10.10 | 4.58 | 1.15 | 0.52 | 0.36[g,h] | 0.16[g,h] |
| P&W TF | Takeoff | 9980 | 4527 | 6.99 | 3.17 | 202.6 | 91.90 | .50 | 0.227 | 9.98 | 4.53 | 3.7 | 1.7 |
|  | Climbout | 7910 | 3588 | 7.91 | 3.59 | 123.4 | 55.97 | .40 | 0.181 | 7.91 | 3.59 | 2.6 | 1.2 |
|  | Approach | 2810 | 1275 | 20.23 | 9.18 | 19.39 | 8.80 | 1.41 | 0.640 | 2.81 | 1.28 | 1.5 | 0.68 |
| JT9D-7 | Idle | 1849 | 838.7 | 142.4 | 64.59 | 5.73 | 2.60 | 55.10 | 24.99 | 1.85 | 0.84 | 2.2[f] | 1.0 |
| P&W TF | Takeoff | 16142 | 7322 | 3.23 | 1.47 | 474.6 | 215.3 | 0.81 | 0.367 | 16.14 | 7.32 | 3.75 | 1.7 |
|  | Climbout | 13193 | 5984 | 6.60 | 2.99 | 282.3 | 128.0 | 1.32 | 0.599 | 13.19 | 5.98 | 4.0 | 1.8 |
|  | Approach | 4648 | 2108 | 44.62 | 20.24 | 36.25 | 16.44 | 4.65 | 2.11 | 4.65 | 2.11 | 2.3 | 1.0 |
| JT9D-70 | Idle | 1800 | 816.5 | 61.20 | 27.76 | 5.76 | 2.61 | 12.24 | 0.55 | 1.80 | 0.82 |  |  |
| P&W TF | Takeoff | 19380 | 8791 | 3.88 | 1.76 | 600.8 | 272.5 | 2.91 | 1.32 | 19.38 | 8.79 |  |  |
|  | Climbout | 15980 | 7248 | 4.79 | 2.17 | 386.7 | 175.4 | 2.40 | 1.09 | 15.98 | 7.25 | (assume JT9D-7 data) |  |
|  | Approach | 5850 | 2654 | 7.61 | 3.45 | 47.39 | 21.50 | 2.63 | 1.19 | 5.85 | 2.65 |  |  |
| JT15D-1 | Idle | 215 | 97.52 | 19.46 | 8.83 | 0.54 | 0.245 | 7.48 | 3.39 | 0.22 | 0.10 |  |  |
| PWC TF | Takeoff | 1405 | 637.3 | 1.41 | 0.640 | 14.19 | 6.44 | 0 | 0 | 1.41 | 0.64 |  |  |
|  | Climbout | 1247 | 565.6 | 1.25 | 0.567 | 11.35 | 5.15 | 0 | 0 | 1.25 | 0.57 |  |  |
|  | Approach | 481 | 218.2 | 11.45 | 5.19 | 2.45 | 1.11 | 1.59 | 0.721 | 0.48 | 0.22 |  |  |
| PT6A-27 | Idle | 115 | 52.16 | 7.36 | 3.34 | 0.28 | 0.127 | 5.77 | 2.62 | 0.12 | 0.05 |  |  |
| PWC TP | Takeoff | 425 | 192.8 | 0.43 | 0.195 | 3.32 | 1.51 | 0 | 0 | 0.43 | 0.19 |  |  |
|  | Climbout | 400 | 181.4 | 0.48 | 0.218 | 2.80 | 1.27 | 0 | 0 | 0.40 | 0.18 |  |  |
|  | Approach | 215 | 97.52 | 4.95 | 2.24 | 1.80 | 0.816 | 0.47 | 0.213 | 0.22 | 0.10 |  |  |
| PT6A-41 | Idle | 147 | 66.63 | 16.95 | 7.69 | 0.29 | 0.132 | 14.94 | 6.78 | 0.15 | 0.07 |  |  |
| PWC TP | Takeoff | 510 | 231.3 | 2.60 | 1.18 | 4.07 | 1.85 | 0.89 | 0.404 | 0.51 | 0.23 |  |  |
|  | Climbout | 473 | 214.6 | 3.07 | 1.39 | 3.58 | 1.62 | 0.96 | 0.435 | 0.47 | 0.21 |  |  |
|  | Approach | 273 | 123.8 | 9.50 | 4.31 | 1.27 | 0.576 | 6.20 | 2.81 | 0.27 | 0.12 |  |  |
| Spey 555-15[i] | Idle | 915 | 415 | 83.2 | 37.7 | 1.6 | 0.7 | 86.0 | 43.5 | 0.92 | 0.42 |  |  |
| RR TF | Takeoff | 5734 | 2600 | 6.5 | 3.0 | 109.2 | 49.5 | 29.5 | 13.4 | 5.73 | 2.60 |  |  |
|  | Climbout | 4677 | 2121 | 0.0 | 0.0 | 68.7 | 31.2 | 2.5 | 1.1 | 4.68 | 2.12 |  |  |
|  | Approach | 1744 | 791 | 34.8 | 15.8 | 10.2 | 4.6 | 14.3 | 6.5 | 1.74 | 0.79 |  |  |
| Spey MK511[g,i] | Idle | 946 | 429.1 | 104.4 | 47.36 | 0.785 | 0.356 | 80.03 | 36.30 | 0.95 | 0.43 | 0.17 | 0.077 |
| RR TF | Takeoff | 7057 | 3201 | 16.16 | 7.33 | 156.7 | 71.08 | 13.97 | 6.34 | 7.06 | 3.20 | 16.0 | 7.3 |
|  | Climbout | 5752 | 2609 | 0.0 | 0.0 | 116.8 | 52.98 | 0.0 | 0.0 | 5.75 | 2.61 | 10.0 | 4.5 |
|  | Approach | 2204 | 999.7 | 48.71 | 22.09 | 16.00 | 7.26 | 20.56 | 9.33 | 2.20 | 1.00 | 1.5 | 0.68 |
| M45H-01[i] | Idle | 366 | 166.0 | 55.63 | 25.23 | 0.622 | 0.282 | 11.53 | 5.23 | 0.37 | 0.17 |  |  |
| RR (Bristol) | Takeoff | 3590 | 1628 | 7.18 | 3.26 | 32.31 | 14.66 | 0.718 | 0.326 | 3.59 | 1.62 |  |  |
| TF | Climbout | 3160 | 1433 | 9.48 | 4.30 | 25.28 | 11.47 | 0.632 | 0.287 | 3.16 | 1.43 |  |  |
|  | Approach | 1067 | 484.0 | 53.56 | 24.29 | 3.57 | 1.62 | 6.61 | 3.00 | 1.07 | 0.48 |  |  |

## TABLE II-1-7 (CONTINUED)

| Model-Series<br>Mfg.[b] Type[b] | Mode | Fuel Rate | | CO | | $NO_x^c$ | | Total HC[d] | | $SO_x^e$ | | Particulates[f] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr |
| RB-211-22B[i]<br>RR TF | Idle | 1718 | 779.3 | 137.6 | 64.42 | 5.31 | 2.41 | 100.1 | 45.36 | 1.72 | 0.78 | | |
| | Takeoff | 14791 | 6709 | 5.62 | 2.55 | 504.1 | 228.7 | 29.14 | 13.22 | 14.79 | 6.71 | | |
| | Climbout | 12205 | 5536 | 14.89 | 6.75 | 301.9 | 136.9 | 8.30 | 3.76 | 12.21 | 5.54 | | |
| | Approach | 4376 | 1985 | 93.78 | 42.54 | 32.26 | 14.63 | 32.16 | 14.59 | 4.38 | 1.99 | | |
| RB-211-524[i]<br>RR TF | Idle | 1769 | 802.4 | 35.91 | 16.29 | 4.74 | 2.15 | 5.43 | 2.46 | 1.77 | 0.80 | | |
| | Takeoff | 17849 | 8096 | 7.32 | 3.32 | 660.4 | 299.6 | 1.96 | 0.889 | 17.85 | 8.10 | | |
| | Climbout | 14688 | 6662 | 7.34 | 3.33 | 470.0 | 213.2 | 2.50 | 1.13 | 14.69 | 6.67 | | |
| | Approach | 5450 | 2472 | 11.72 | 5.32 | 62.89 | 28.53 | 0.545 | 0.247 | 5.45 | 2.47 | | |
| RB-401-06[i]<br>RR TF | Idle | 330 | 149.7 | 10.07 | 4.57 | 0.825 | 0.374 | 0.924 | 0.419 | 0.33 | 0.15 | | |
| | Takeoff | 2400 | 1089 | 2.40 | 1.09 | 30.0 | 13.61 | 0.120 | 0.054 | 2.40 | 1.09 | | |
| | Climbout | 2130 | 966.2 | 2.77 | 1.26 | 24.07 | 10.92 | 0.107 | 0.049 | 2.13 | 0.97 | | |
| | Approach | 775 | 351.5 | 5.04 | 2.29 | 3.88 | 1.76 | 0.155 | 0.070 | 0.78 | 0.35 | | |
| Dart RDa7[i]<br>RR TP | Idle | 411 | 186.4 | 37.61 | 17.06 | 0.292 | 0.132 | 25.52 | 11.58 | 0.41 | 0.19 | | |
| | Takeoff | 1409 | 639.1 | 4.79 | 2.17 | 8.51 | 3.86 | 8.75 | 3.97 | 1.41 | 0.64 | | |
| | Climbout | 1248 | 566.1 | 4.26 | 1.93 | 5.55 | 2.52 | 2.15 | 0.975 | 1.25 | 0.57 | | |
| | Approach | 645 | 292.6 | 21.48 | 9.74 | 0.568 | 0.258 | 0.0 | 0.0 | 0.65 | 0.29 | | |
| Tyne[g,i]<br>RR TP | Idle | 619 | 280.8 | 40.79 | 18.50 | 0.477 | 0.216 | 6.63 | 3.01 | 0.62 | 0.28 | | |
| | Takeoff | 2372 | 1076 | 1.21 | 0.549 | 27.11 | 12.30 | 2.87 | 1.31 | 2.37 | 1.08 | | |
| | Climbout | 2188 | 922.5 | 1.29 | 0.585 | 25.23 | 11.44 | 2.63 | 1.19 | 2.19 | 0.99 | | |
| | Approach | 1095 | 496.7 | 11.30 | 5.13 | 9.00 | 4.08 | 2.68 | 1.22 | 1.10 | 0.50 | | |
| Olympus 593[i]<br>MK610<br>RR (Bristol)<br>TJ | Idle | 3060 | 1388 | 342.7 | 155.4 | 9.72 | 4.41 | 119.3 | 54.11 | 3.06 | 1.39 | | |
| | Takeoff | 52200 | 23673 | 1513.8 | 686.5 | 542.9 | 246.2 | 151.4 | 68.7 | 52.2 | 23.7 | | |
| | Climbout | 19700 | 8936 | 275.8 | 125.1 | 169.4 | 76.84 | 31.52 | 14.30 | 19.70 | 8.94 | | |
| | Descent | 5400 | 2449 | 426.6 | 193.5 | 18.9 | 8.6 | 132.3 | 60.0 | 5.4 | 2.4 | | |
| | Approach | 9821 | 4455 | 451.8 | 204.9 | 41.25 | 18.71 | 93.30 | 42.32 | 9.82 | 4.46 | | |
| 0-200<br>Con. O | Idle | 8.24 | 3.75 | 5.31 | 2.42 | 0.013 | 0.006 | 0.239 | 0.107 | 0.0 | 0 | | |
| | Takeoff | 45.17 | 20.53 | 44.0 | 20.0 | 0.220 | 0.100 | 0.940 | 0.427 | 0.01 | 0 | | |
| | Climbout | 45.17 | 20.53 | 44.0 | 20.0 | 0.220 | 0.100 | 0.940 | 0.427 | 0.01 | 0 | | |
| | Approach | 25.50 | 11.59 | 30.29 | 13.75 | 0.029 | 0.013 | 0.847 | 0.385 | 0.01 | 0 | | |
| TSIO-360C<br>Con. O | Idle | 11.5 | 5.21 | 6.81 | 3.09 | 0.022 | 0.009 | 1.59 | 0.723 | 0.0 | 0.0 | | |
| | Takeoff | 133. | 60.3 | 143.9 | 65.3 | 0.36 | 0.16 | 1.22 | 0.55 | 0.03 | 0.01 | | |
| | Climbout | 99.5 | 45.1 | 95.6 | 43.4 | 0.43 | 0.20 | 0.95 | 0.43 | 0.02 | 0.01 | | |
| | Approach | 61.0 | 27.7 | 60.7 | 27.5 | 0.23 | 0.10 | 0.69 | 0.31 | 0.01 | 0.01 | | |
| 6-285-B<br>(Tiara)<br>Con. O | Idle | 72.12 | 10.03 | 26.23 | 11.90 | 0.0334 | 0.0152 | 0.773 | 0.350 | 0.0 | 0.0 | | |
| | Takeoff | 153.0 | 69.39 | 152.7 | 69.3 | 0.899 | 0.408 | 1.78 | 0.806 | 0.03 | 0.01 | | |
| | Climbout | 166.0 | 52.61 | 110.9 | 50.3 | 0.913 | 0.414 | 1.39 | 0.632 | 0.02 | 0.01 | | |
| | Approach | 83.5 | 37.88 | 85.39 | 38.77 | 0.394 | 0.179 | 1.343 | 0.609 | 0.02 | 0.01 | | |

# TABLE II-1-7 (CONCLUDED)

| Model-Series Mfg.[b] Type[b] | Mode | Fuel Rate |  | CO |  | $NO_x$[c] |  | Total HC[d] |  | $SO_x$[e] |  | Particulate[f] |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr |
| O-320<br>Lyc. O | Idle | 9.48 | 4.30 | 10.21 | 4.63 | 0.0049 | 0.0022 | 0.350 | 0.159 | 0.0 | 0.0 |  |  |
|  | Takeoff | 89.1 | 40.4 | 96.0 | 43.5 | 0.195 | 0.088 | 1.05 | 0.475 | 0.02 | 0.01 |  |  |
|  | Climbout | 66.7 | 30.3 | 66.0 | 29.9 | 0.265 | 0.120 | 0.826 | 0.375 | 0.01 | 0.01 |  |  |
|  | Approach | 46.5 | 21.1 | 56.8 | 25.8 | 0.044 | 0.020 | 0.895 | 0.406 | 0.01 | 0.0 |  |  |
| IO-320-DIAD<br>Lyc. O | Idle | 7.84 | 3.56 | 4.86 | 2.20 | 0.009 | 0.0041 | 0.283 | 0.128 | 0.0 | 0.0 |  |  |
|  | Takeoff | 91.67 | 41.57 | 109.3 | 49.55 | 0.167 | 0.0756 | 1.047 | 0.475 | 0.02 | 0.01 |  |  |
|  | Climbout | 61.42 | 27.85 | 54.55 | 24.74 | 0.344 | 0.156 | 0.588 | 0.267 | 0.01 | 0.01 |  |  |
|  | Approach | 37.67 | 17.08 | 35.57 | 16.13 | 0.128 | 0.058 | 0.460 | 0.208 | 0.01 | 0.0 |  |  |
| IO-360-B<br>Lyc. O | Idle | 8.09 | 3.68 | 7.26 | 3.29 | 0.0094 | 0.0042 | 0.398 | 0.180 | 0.0 | 0.0 |  |  |
|  | Takeoff | 103.0 | 46.7 | 123.5 | 56.0 | 0.205 | 0.093 | 1.03 | 0.469 | 0.02 | 0.01 |  |  |
|  | Climbout | 71.7 | 32.5 | 70.5 | 32.0 | 0.329 | 0.149 | 0.585 | 0.265 | 0.01 | 0.01 |  |  |
|  | Approach | 36.6 | 16.6 | 25.3 | 11.5 | 0.372 | 0.169 | 0.355 | 0.161 | 0.01 | 0.0 |  |  |
| TIO-540-<br>J2B2<br>Lyc. O | Idle | 25.06 | 11.36 | 32.42 | 14.70 | 0.0097 | 0.0044 | 1.706 | 0.774 | 0.01 | 0.0 |  |  |
|  | Takeoff | 259.7 | 117.8 | 374.5 | 169.8 | 0.094 | 0.043 | 3.21 | 1.46 | 0.05 | 0.02 |  |  |
|  | Climbout | 204.5 | 92.7 | 300.8 | 136.4 | 0.0481 | 0.0218 | 3.40 | 1.54 | 0.04 | 0.02 |  |  |
|  | Approach | 99.4 | 45.1 | 125.4 | 56.9 | 0.138 | 0.0623 | 1.33 | 0.604 | 0.02 | 0.01 |  |  |

[a] References 1,2.

[b] Abbreviations: All – Detroit Diesel Allison Division of General Motors; Con – Teledyne/Continental; GA – Garrett AiResearch; GE – General Electric; Lyc – Avco/Lycoming; P&W – Pratt & Whitney; PWC – Pratt & Whitney Aircraft of Canada; RR – Rolls Royce; TJ – Turbojet; TF – Turbofan; TP – Turboprop; O – Reciprocating (Piston) Opposed.

[c] Nitrogen oxides reported as $NO_2$.

[d] Total hydrocarbons. Volatile organics, including unburned hydrocarbons and organic pyrolysis products.

[e] Sulfur oxides and sulfuric acid reported as $SO_2$. Calculated from fuel rate and 0.05 wt% sulfur in Jet A and Jet B fuel, or 0.01 wt% sulfur in aviation gasoline. For turbine engines, the conversion is therefore $SO_x$ (lb/hr) = $10^{-3}$ (fuel rate), and for piston engines, the conversion is $SO_x$ (lb/hr) = $2 \times 10^{-4}$ (fuel rate).

[f] All particulate data are from Reference 4. Does not include condensible compounds.

[g] The indicated reference does not specify series number for this model engine.

[h] "Diluted smokeless" JT 8D. Note: JT8D is a turbofan engine and is not equivalent to the JT8 (Military J52) turbojet engine.

[i] All Rolls Royce data are based upon an arbitrary 7% idle, which does not reflect the actual situation. In reality, Rolls Royce engines will idle at 5-6% with correspondingly higher emissions (Reference 2).

[j] The Olympus 593 engine used in the Concorde SST has a unique 6-mode LTO cycle.

## TABLE II-1-8. MODAL EMISSION RATES – MILITARY AIRCRAFT ENGINES[a]

| Model-Series (Civil Version) Mfg[h] Type[h] | Mode | Fuel Rate | | CO | | $NO_x$[b] | | Total HC[c] | | $SO_x$[d] | | Particulates[e, f] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr |
| J57-P-22 (JT3C) P&W TJ | Idle | 1087 | 493 | 64.4 | 29.2 | 2.7 | 1.2 | 55.8 | 25.3 | 1.1 | 0.5 | 8.3 | 3.8 |
| | Takeoff | 8358 | 3791 | 14.9 | 6.8 | 93.3 | 42.3 | 5.4 | 2.4 | 8.4 | 3.8 | 12.0 | 5.4 |
| | Climbout | 8358 | 3791 | 14.9 | 6.8 | 93.3 | 42.3 | 5.4 | 2.4 | 8.4 | 3.8 | 12.0 | 5.4 |
| | Approach | 1693 | 768 | 39.8 | 18.1 | 5.0 | 2.3 | 21.0 | 9.5 | 1.7 | 0.8 | | |
| J65-W-20 Wr. TJ | Idle | 1333 | 605 | 66.9 | 30.3 | 3.7 | 1.7 | 5.0 | 2.3 | 1.3 | 0.6 | | |
| | Takeoff | 6421 | 2913 | 49.6 | 22.5 | 48.5 | 22.0 | 0.2 | 0.1 | 6.4 | 2.9 | | |
| | Climbout | 6421 | 2913 | 49.6 | 22.5 | 48.5 | 22.0 | 0.2 | 0.1 | 6.4 | 2.9 | | |
| | Approach | 3260 | 1479 | 52.6 | 23.9 | 23.7 | 10.8 | 0.9 | 0.4 | 3.3 | 1.5 | | |
| J79-GE-10 GE TJ | Idle | 1100 | 499 | 48.0 | 21.8 | 3.2 | 1.5 | 9.8 | 4.4 | 1.1 | 0.5 | 57.8 | 26.2 |
| | Takeoff | 35390 | 16053 | 611.9 | 277.6 | 241.3 | 109.5 | 17.2 | 7.8 | 35.4 | 16.1 | 299.7 | 135.9 |
| | Climbout | 9880 | 4482 | 52.0 | 23.6 | 151.8 | 68.9 | 16.0 | 7.3 | 9.9 | 4.5 | 77.7 | 35.2 |
| | Approach | 6190 | 2808 | 45.6 | 20.7 | 69.9 | 31.7 | 4.1 | 1.9 | 6.2 | 2.8 | 67.0 (nom) | 30.4 |
| J85-GE-5F GE TJ for T38 | Idle | 524 | 328 | 93.3 | 42.3 | 0.7 | 0.3 | 15.7 | 7.1 | 0.5 | 0.2 | | |
| | Takeoff | 8470 | 3942 | 245.6 | 111.4 | 22.0 | 10.0 | 6.8 | 3.1 | 8.5 | 3.9 | | |
| | Climbout | 1297 | 588 | 55.8 | 25.3 | 3.0 | 1.4 | 4.5 | 2.0 | 1.3 | 0.6 | | |
| | Approach | 1098 | 498 | 63.7 | 28.9 | 3.0 | 1.4 | 1.3 | 0.6 | 1.1 | 0.5 | | |
| J85-GE-21 GE TJ for F-5 | Idle | 400 | 181 | 63.6 | 28.4 | 0.5 | 0.2 | 9.7 | 4.4 | 0.4 | 0.2 | | |
| | Takeoff | 10650 | 4831 | 387.7 | 175.8 | 59.6 | 27.0 | 1.1 | 0.5 | 10.7 | 4.9 | | |
| | Climbout | 3200 | 1452 | 69.0 | 31.3 | 16.0 | 7.3 | 0.8 | 0.4 | 3.2 | 1.5 | | |
| | Approach | 1200 | 544 | 55.5 | 25.1 | 3.5 | 1.6 | 3.1 | 1.4 | 1.2 | 0.5 | | |
| TF30-P-6B (JFT 10) P&W TF for A-7 | Idle | 689 | 313 | 47.0 | 21.3 | 0.9 | 0.4 | 12.9 | 5.9 | 0.7 | 0.3 | | |
| | Takeoff | 6835 | 3100 | 21.1 | 9.6 | 82.3 | 37.3 | 6.9 | 3.1 | 6.8 | 3.1 | | |
| | Climbout | 6835 | 3100 | 21.1 | 9.6 | 82.3 | 37.3 | 6.9 | 3.1 | 6.8 | 3.1 | | |
| | Approach | 3550 | 1610 | 22.4 | 10.2 | 23.7 | 10.8 | 10.5 | 4.8 | 3.6 | 1.6 | | |
| TF30-P-412A (JFT 10A) P&W TJ for F-14 | Idle | 999 | 453 | 68.1 | 30.9 | 2.4 | 1.1 | 38.4 | 17.4 | 1.0 | 0.5 | 26.5 | 12.0 |
| | Takeoff | 40000 | 18144 | 600.0 | 272.2 | 270.0 | 122.5 | 40.0 | 18.1 | 40.0 | 18.1 | 693.2 | 314.4 |
| | Climbout | 7394 | 3354 | 15.7 | 7.1 | 123.2 | 55.9 | 0.7 | 0.3 | 7.4 | 3.4 | 61.7 | 29.0 |
| | Approach | 2598 | 1178 | 39.5 | 17.9 | 18.4 | 8.3 | 2.9 | 1.3 | 2.6 | 1.2 | 46.6 (nom) | 21.2 |
| TF33-P-3/5/7 (JT3D) P&W TJ | Idle | 846 | 384 | 74.9 | 34.0 | 1.5 | 0.7 | 77.8 | 35.3 | 0.8 | 0.4 | 4.4 | 2.0 |
| | Takeoff | 9979 | 4526 | 13.0 | 5.9 | 109.8 | 49.8 | 3.0 | 1.4 | 10.0 | 4.5 | 79.8 | 36.2 |
| | Climbout | 7323 | 3322 | 13.2 | 6.0 | 65.9 | 29.9 | 2.9 | 1.3 | 7.3 | 3.3 | 102.5 | 46.5 |
| | Approach | 3797 | 1722 | 34.2 | 15.5 | 27.7 | 12.6 | 14.4 | 6.5 | 3.8 | 1.7 | 53.1 | 24.1 |
| TF34-GE-400 GE TJ | Idle | 457 | 207 | 35.0 | 15.9 | 0.6 | 0.3 | 7.1 | 3.2 | 0.5 | 0.2 | | |
| | Takeoff | 3796 | 1722 | 9.3 | 4.2 | 20.9 | 9.5 | 1.6 | 0.7 | 3.8 | 1.7 | | |
| | Climbout | 3796 | 1722 | 9.3 | 4.2 | 20.9 | 9.5 | 1.6 | 0.7 | 3.8 | 1.7 | | |
| | Approach | 1296 | 588 | 19.4 | 8.8 | 10.0 | 4.5 | 0.8 | 0.4 | 1.3 | 0.6 | | |

# TABLE II-1-8 (CONCLUDED)

| Model-Series (Civil-Version) Mfg[h] Type[h] | Mode | Fuel Rate | | CO | | $NO_x$[b] | | Total HC[c] | | $SO_x$[d] | | Particulates[e, f] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr | lb/hr | kg/hr |
| TF39-GE-1<br>(JT4A)<br>GE TJ | Idle | 1130 | 513 | 75.7 | 34.3 | 3.4 | 1.5 | 26.0 | 11.8 | 1.1 | 0.5 | 0.3[g] | 0.1 |
| | Takeoff | 11410 | 5176 | 8.0 | 3.6 | 319.5 | 144.9 | 2.3 | 1.0 | 11.4 | 5.2 | 17.1[g] | 7.8 |
| | Climbout | 5740 | 2604 | 4.0 | 1.8 | 160.7 | 72.9 | 1.1 | 0.5 | 5.7 | 2.6 | 8.0[g] | 3.6 |
| | Approach | 5740 | 2604 | 4.0 | 1.8 | 160.7 | 72.9 | 1.1 | 0.5 | 5.7 | 2.6 | 8.0[g] | 3.6 |
| TF41-A-2<br>All. TF | Idle | 1070 | 485 | 114.6 | 52.0 | 1.4 | 0.6 | 70.8 | 32.1 | 1.1 | 0.5 | | |
| | Takeoff | 9040 | 4101 | 14.4 | 6.5 | 201.4 | 91.4 | 5.3 | 2.4 | 9.0 | 4.1 | | |
| | Climbout | 9040 | 4101 | 14.4 | 6.5 | 201.4 | 91.4 | 5.3 | 2.4 | 9.0 | 4.1 | | |
| | Approach | 5314 | 2410 | 27.5 | 12.5 | 56.6 | 25.7 | 12.9 | 5.9 | 5.3 | 2.4 | | |
| F100-PW-100<br>(JTF 22)<br>P&W TF | Idle | 1060 | 481 | 20.5 | 9.3 | 4.2 | 1.9 | 2.4 | 1.1 | 1.1 | 0.5 | 0.1[g] | 0.05 |
| | Takeoff | 44200 | 20049 | 2435.4 | 1104.7 | 729.3 | 330.8 | 4.4 | 2.0 | 44.2 | 20.0 | 0.0[g] | 0.0 |
| | Climbout | 10400 | 4717 | 18.7 | 8.5 | 457.6 | 207.6 | 0.5 | 0.2 | 10.4 | 4.7 | 8.6[g] | 3.9 |
| | Approach | 3000 | 1361 | 9.0 | 4.1 | 33.0 | 15.0 | 1.8 | 0.8 | 3.0 | 1.4 | 1.0[g] | 0.5 |
| PT6A-27<br>PWC TP | Idle | 115 | 52 | 7.36 | 3.34 | 0.28 | 0.13 | 5.77 | 2.62 | 0.12 | 0.05 | | |
| | Takeoff | 425 | 193 | 0.43 | 0.20 | 3.32 | 1.51 | 0 | 0 | 0.43 | 0.20 | | |
| | Climbout | 400 | 181 | 0.48 | 0.22 | 2.80 | 1.27 | 0 | 0 | 0.40 | 0.18 | | |
| | Approach | 215 | 98 | 5.0 | 2.24 | 1.80 | 0.82 | 0.47 | 0.21 | 0.22 | 0.10 | | |
| T56-A7<br>All. TP | Idle | 548 | 249 | 17.5 | 7.9 | 2.1 | 1.0 | 11.5 | 5.2 | 0.5 | 0.2 | 1.6 | 0.7 |
| | Takeoff | 2079 | 943 | 4.4 | 2.0 | 19.3 | 8.8 | 0.8 | 0.4 | 2.1 | 1.0 | 3.7 | 1.7 |
| | Climbout | 1908 | 865 | 4.6 | 2.1 | 17.6 | 8.0 | 0.9 | 0.4 | 0.9 | 0.4 | 3.0 | 1.4 |
| | Approach | 1053 | 478 | 3.7 | 1.7 | 7.8 | 3.5 | 0.5 | 0.2 | 1.1 | 0.5 | 3.0 | 1.4 |
| T53-L-11D<br>(LTC1)<br>Lyc TS | Idle | 142 | 64 | 4.2 | 1.9 | 0.2 | 0.1 | 9.0 | 4.1 | 0.14 | 0.06 | | |
| | Climbout[i] | 679 | 308 | 2.0 | 0.9 | 5.0 | 2.3 | 0.2 | 0.1 | 0.68 | 0.31 | | |
| | Approach | 679 | 308 | 2.0 | 0.9 | 5.0 | 2.3 | 0.2 | 0.1 | 0.68 | 0.31 | | |
| T55-L-11A<br>(LTC4)<br>Lyc TS | Idle | | | 29.5 | 13.4 | 0.8 | 4.0 | 4.0 | 1.8 | | | | |
| | Climbout[i] | | | 14.5 | 6.6 | 18.6 | 8.4 | 0.2 | 0.1 | | | | |
| | Approach | | | 12.9 | 5.9 | 9.1 | 4.1 | 0.3 | 0.1 | | | | |
| T58-GE-5<br>GE TS | Idle | 133 | 60 | 22.5 | 10.2 | 0.2 | 0.1 | 12.9 | 5.9 | 0.1 | 0.05 | 0.1 | 0.05 |
| | Climbout[i] | 886 | 402 | 5.0 | 2.3 | 6.4 | 2.9 | 0.7 | 0.3 | 0.9 | 0.4 | 0.8 | 0.4 |
| | Approach | 886 | 402 | 5.0 | 2.3 | 6.4 | 2.9 | 0.7 | 0.3 | 0.9 | 0.4 | 0.8 | 0.4 |

[a] Reference 1.

[b] **Nitrogen oxides reported as $NO_2$.**

[c] Total hydrocarbons. Volatile organics, including unburned hydrocarbons and organic pyrolysis products.

[d] Sulfur oxides and sulfuric acid reported as $SO_2$. Calculated from fuel rate and 0.05 wt% sulfur in JP-4 or JP-5 fuel, or 0.01 wt% sulfur in aviation gasoline. For turbine engines, the conversion is therefore $SO_x$ (lb/hr) = $10^{-3}$ (fuel rate), and for piston engines, the conversion is $SO_x$ (lb/hr) = $2 \times 10^{-4}$ (fuel rate).

[e] **Includes all "condensible particulates," and thus may be much higher than solid particulates alone (except as noted in g below).**

[f] **"Nom." data are interpolated values assumed for calculational purposes, in the absence of experimental data.**

[g] **Dry particles only.**

[h] For abbreviations, see footnote, Table II-1-2.

[i] "Takeoff" mode is undefined for helicopters.

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## TABLE II-1-9. EMISSION FACTORS PER AIRCRAFT PER LANDING/TAKEOFF CYCLE–CIVIL AIRCRAFT[a]

| Commercial Carrier Aircraft | Power Plant[b] | | | CO | | $NO_x$[c] | | Total HC[d] | | $SO_x$[e] | | Particulates | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. | Mfg. | Model-Series | lb | kg | lb | kg | lb | kg | lb | kg | lb | kg |
| **Short, Medium, Long Range and Jumbo Jets** | | | | | | | | | | | | | |
| BAC/Aerospatiale Concorde | 4 | RR | Olymp 593 | 847.0 | 384.0 | 91.0 | 41.0 | 246.0 | 112.0 | 14.1 | 6.4 | | |
| BAC 111-400 | 2 | RR | Spey 511 | 103.36 | 46.88 | 15.04 | 6.82 | 72.42 | 32.85 | 1.70 | 0.77 | 1.46 | 0.66 |
| Boeing 707-320B | 4 | P&W | JT3D-7 | 262.64 | 119.12 | 25.68 | 11.64 | 218.24 | 99.00 | 4.28 | 1.94 | 4.52 | 2.05 |
| Boeing 727-200 | 3 | P&W | JT8D-17 | 55.95 | 25.38 | 29.64 | 13.44 | 13.44 | 6.09 | 3.27 | 1.48 | 1.17 | 0.53 |
| Boeing 737-200 | 2 | P&W | JT8D-17 | 37.30 | 16.92 | 19.76 | 8.96 | 8.96 | 4.06 | 2.18 | 0.99 | 0.78 | 0.35 |
| Boeing 747-200B | 4 | P&W | JT9D-7 | 259.64 | 117.76 | 83.24 | 37.76 | 96.92 | 43.96 | 7.16 | 3.25 | 5.20 | 2.36 |
| Boeing 747-200B | 4 | P&W | JT9D-70 | 108.92 | 49.40 | 107.48 | 48.76 | 22.40 | 10.16 | 7.96 | 3.61 | 5.20 | 2.36 |
| Boeing 747-200B | 4 | RR | RB211-524 | 66.76 | 30.28 | 124.9 | 56.65 | 10.00 | 4.54 | 7.52 | 3.41 | | |
| Lockheed L1011-200 | 3 | RR | RB211-524 | 50.07 | 27.71 | 93.66 | 42.48 | 7.50 | 3.40 | 5.64 | 2.56 | | |
| Lockheed L1011-100 | 3 | RR | RB211-22B | 199.4 | 90.44 | 64.29 | 29.16 | 138.4 | 62.77 | 4.95 | 2.24 | | |
| McDonnell-Douglas DC8-63 | 4 | P&W | JT3D-7 | 262.64 | 119.12 | 25.68 | 11.64 | 218.24 | 99.00 | 3.27 | 1.48 | 1.17 | 0.53 |
| McDonnell-Douglas DC9-50 | 2 | P&W | JT8D-17 | 37.30 | 16.92 | 19.76 | 8.96 | 8.96 | 4.06 | 2.18 | 0.99 | 0.76 | 0.35 |
| McDonnell-Douglas DC10-30 | 3 | GE | CF6-50C | 116.88 | 53.01 | 49.59 | 22.17 | 47.10 | 21.36 | 4.98 | 2.26 | 0.21 | 0.10 |
| **Air Carrier Turboprops – Commuter, Feeder Line and Freighters** | | | | | | | | | | | | | |
| Beech 99 | 2 | PWC | PT6A-28 | 7.16 | 3.25 | 0.82 | 0.37 | 5.08 | 2.30 | 0.18 | 0.08 | | |
| GD/Convair 580 | 2 | All | 501 | 24.38 | 11.06 | 21.66 | 9.82 | 9.82 | 4.45 | 0.92 | 0.42 | | |
| DeHavilland Twin Otter | 2 | PWC | PT6A-27 | 7.16 | 3.25 | 0.82 | 0.37 | 5.08 | 2.30 | 0.18 | 0.08 | | |
| Fairchild F27 and FH227 | 2 | RR | R.Da.7 | 36.26 | 16.45 | 0.92 | 0.42 | 22.42 | 10.17 | 0.58 | 0.26 | | |
| Grumman Goose | 2 | PWC | PT6A-27 | 7.16 | 3.25 | 0.82 | 0.37 | 5.08 | 2.30 | 0.18 | 0.08 | | |
| Lockheed L188 Electra | 4 | All | 501 | 48.76 | 22.12 | 43.32 | 19.65 | 19.64 | 8.91 | 1.84 | 0.83 | | |
| Lockheed L100 Hercules | 4 | All | 501 | 48.76 | 22.12 | 43.32 | 19.65 | 19.64 | 8.91 | 1.84 | 0.83 | | |
| Swearingen Metro-2 | 2 | GA | TPE 331-3 | 6.26 | 2.84 | 1.16 | 0.53 | 7.68 | 3.48 | 0.16 | 0.07 | 0.46 | 0.21 |

## TABLE II-1-9 (CONCLUDED)

| General Aviation Aircraft | Power Plant[b] |  |  | CO |  | $NO_x$[c] |  | Total HC[d] |  | $SO_x$[e] |  | Particulates |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  | No. | Mfg. | Model-Series | lb | kg | lb | kg | lb | kg | lb | kg | lb | kg |
| Business Jets |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cessna Citation | 2 | P&W | JT15D-1 | 19.50 | 8.85 | 2.00 | 0.91 | 6.72 | 3.05 | 0.40 | 0.18 |  |  |
| Dassault Falcon 20 | 2 | GE | CF700-2D | 76.14 | 34.54 | 1.68 | 0.76 | 7.40 | 3.36 | 0.78 | 0.35 |  |  |
| Gates Learjet 24D | 2 | GE | CJ610-6 | 88.76 | 40.26 | 1.58 | 0.72 | 8.42 | 3.82 | 0.84 | 0.38 |  |  |
| Gates Learjet 35, 36 | 2 | GE | TPE 731-2 | 11.26 | 5.11 | 3.74 | 1.58 | 3.74 | 1.70 | 0.92 | 0.42 |  |  |
| Rockwell International Shoreliner 75A | 2 | GE | CF 700 | 76.14 | 34.54 | 1.08 | 0.76 | 7.40 | 3.36 | 0.78 | 0.35 |  |  |
| Business Turboprops (EPA Class P2) |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Beech B99 Airliner | 2 | PWC | PT6A-27 | 7.16 | 3.25 | 0.82 | 0.37 | 5.08 | 2.30 | 0.18 | 0.08 |  |  |
| DeHavilland Twin Otter | 2 | PWC | PT6A-27 | 7.16 | 3.25 | 0.82 | 0.37 | 5.08 | 2.30 | 0.18 | 0.08 |  |  |
| Shorts Skyvan-3 | 2 | GA | TPE-331-2 | 6.44 | 2.92 | 0.883 | 0.400 | 8.40 | 3.81 | 0.16 | 0.07 | 0.46 | 0.21 |
| Swearingen Merlin IIIA | 2 | GA | TPE-331-3 | 6.28 | 2.85 | 1.15 | 0.522 | 7.71 | 3.50 | 0.16 | 0.07 | 0.46 | 0.21 |
| General Aviation Piston (EPA Class P1) |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Cessna 150 | 1 | Con | 0-200 | 8.32 | 3.77 | 0.02 | 0.01 | 0.23 | 0.10 | 0.0 | 0.0 |  |  |
| Piper Warrior | 1 | Lyc | 0-320 | 14.37 | 6.52 | 0.02 | 0.01 | 0.26 | 0.12 | 0.0 | 0.0 |  |  |
| Cessna Pressurized Skymaster | 2 | Con | TS10-360C | 33.10 | 15.01 | 0.13 | 0.06 | 1.15 | 0.52 | 0.0 | 0.0 |  |  |
| Piper Navajo Chieftain | 2 | Lyc | T10-540 | 96.24 | 43.65 | 0.02 | 0.01 | 1.76 | 0.80 | 0.0 | 0.0 |  |  |

[a] Reference 2.

[b] Abbreviations: All – Detroit Diesel Allison Division of General Motors; Con – Teledyne/Continental; GA – Garrett AiResearch; GE – General Electric; Lyc – Avco/Lycoming; P&W – Pratt & Whitney; PWC – Pratt & Whitney Aircraft of Canada; RR – Rolls Royce.

[c] Nitrogen oxides reported as $NO_2$.

[d] Total hydrocarbons. Volatile organics, including unburned hydrocarbons and organic pyrolysis products.

[e] Sulfur oxides and sulfuric acid reported as $SO_2$.

## Table II-1-10. EMISSIONS FOR MILITARY AIRCRAFT LANDING/TAKEOFF CYCLES[a]

| Aircraft | | Power plant No. | Power plant Model/Series | TIM[b] code | CO | | $NO_x$[c] | | Total HC[d] | | $SO_x$[e] | | Particulates | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | lb | kg | lb | kg | lb | kg | lb | kg | lb | kg |
| Fixed Wing - Turbine | | | | | | | | | | | | | | |
| A-4C | Skyhawk | 1 | J65-W-20 | 2 | 16.62 | 7.54 | 2.15 | 0.98 | 1.10 | 0.50 | 0.46 | 0.21 | | |
| A-7 | Corsair 2 | 1 | TP30-.-68 | 2 | 11.10 | 5.03 | 2.05 | 0.93 | 3.18 | 1.44 | 0.35 | 0.16 | | |
| A-7 | Corsair 2 | 1 | TF41-A-2 | 2 | 25.79 | 11.70 | 4.83 | 2.19 | 15.76 | 7.15 | 0.52 | 0.24 | | |
| B-52H | Stratofortress | 8 | TF-33-P-3/5/8 | 7 | 504.08 | 228.65 | 53.04 | 24.06 | 505.76 | 229.41 | 10.24 | 4.64 | 94.08 | 42.67 |
| F-4 | Phantom 2 | 2 | J79-GE-10 | 2 | 32.24 | 14.62 | 10.88 | 4.94 | 4.94 | 2.24 | 1.46 | 0.66 | 33.92 | 15.39 |
| F-5 | Freedom Fighter/Tiger | 2 | J85-GE-21 | 1 | 76.64 | 34.76 | 2.10 | 0.95 | 10.04 | 4.55 | 0.76 | 0.34 | | |
| F-14 | Tomcat | 2 | TF30-P-412A | 2 | 39.88 | 18.09 | 7.62 | 3.46 | 17.36 | 7.87 | 1.24 | 0.56 | 24.24 | 11.00 |
| F-15A | Eagle | 2 | F100-PW-100 | 1 | 54.40 | 24.68 | 29.96 | 13.58 | 2.68 | 1.22 | 2.32 | 1.06 | 0.44 | 0.20 |
| F-16 | - | 1 | F100-PW-100 | 1 | 27.20 | 12.34 | 14.98 | 6.79 | 1.34 | 0.61 | 1.16 | 0.53 | 0.22 | 0.10 |
| C-5A | Galaxy | 4 | TF39-GE-1 | 5 | 82.12 | 37.25 | 79.60 | 36.11 | 28.08 | 12.74 | 3.84 | 1.74 | 4.12 | 1.87 |
| C-130 | Hercules | 4 | T56-A-7 | 6 | 32.36 | 14.68 | 9.60 | 4.35 | 20.28 | 9.20 | 1.60 | 0.73 | 4.36 | 1.98 |
| KC-135 | Stratotanker | 4 | J57-P-22 | 7 | 220.92 | 100.21 | 24.64 | 11.18 | 185.56 | 84.17 | 5.36 | 2.43 | 31.36 | 14.22 |
| C-141 | Starlifter | 4 | TF33-P-3/5/7 | 5 | 92.40 | 41.91 | 19.20 | 8.71 | 87.68 | 39.77 | 3.00 | 1.36 | 33.00 | 14.97 |
| T-34C | Turbo Mentor | 1 | PT6A-27 | 2 | 1.73 | 0.73 | 0.15 | 0.07 | 1.27 | 0.58 | 0.03 | 0.01 | | |
| T-38 | Talon | 2 | J85-GE-5F | 3 | 82.72 | 32.99 | 1.22 | 0.55 | 10.42 | 4.73 | 0.62 | 0.28 | | |
| P-3C | Orion | 4 | T56-A-7 | 6 | 32.36 | 14.68 | 9.60 | 4.35 | 20.28 | 9.20 | 1.60 | 0.73 | 4.36 | 1.98 |
| S3A | Viking | 2 | TF34-GE-400 | 6 | 34.18 | 15.50 | 4.04 | 1.83 | 6.44 | 2.92 | 1.02 | 0.46 | | |
| Helicopters - Turbine | | | | | | | | | | | | | | |
| UH-1H | Iroquois/Huey | 1 | T53-L-11D | 9 | 1.55 | 0.70 | 1.19 | 0.54 | 2.53 | 1.15 | 0.20 | 0.09 | | |
| HH-3 | Sea King/Jolly Green Giant | 2 | T58-GE-5 | 9 | 13.54 | 6.14 | 3.02 | 1.37 | 6.78 | 3.08 | 0.44 | 0.20 | 0.40 | 0.18 |
| CH-47 | Chinook | 2 | T55-L-11A | 9 | 20.94 | 9.50 | 6.68 | 3.03 | 2.10 | 0.95 | | | | |

[a] Reference 1.

[b] Defined in Table II-1-5.

[c] Nitrogen oxides reported as $NO_2$.

[d] Total hydrocarbons. Volatile organics, including unburned hydrocarbons and organic pyrolysis products.

[e] Sulfur oxides and sulfuric acid reported as $SO_2$.

## II- 1.3 Modal Emission Rates and Emission Factors per LTO Cycle

The first step in the calculation of aircraft emission factors is the development of a set of modal emission rates. These represent the quantity of pollutant released per unit time in each of the standard modes. Each mode is characterized by an engine power setting (given in Tables II- 1-5 and II- 1-6) and a fuel rate (the quantity of fuel consumed per unit time).

The following procedure is for calculation of aircraft emission factors per LTO cycle, starting with engine modal emission rates:

1) For a specific aircraft, determine the number and model of engines, using for example, Tables II- 1-1 or II- 1-2.

2) Using Table II-1-7 or II- 1-8, locate the appropriate engine data, and prepare a list of modal emission rates for each mode m and pollutant p:

$$\left(\frac{\Delta e}{\Delta t}\right)_{m,p}$$

3) Using known military assignment and mission, or civil aircraft type and application, use Table II- 1-3 or II- 1-4 to select an appropriate set of times-in-mode $(TIM)_m$.

4) For each mode m and pollutant p, multiply the modal emission rate and TIM data for each mode and the sum over all modes. This will yield an emission factor per engine, which must be multiplied by the number of engines, N, to produce the emission factor per LTO cycle, $E_p$, for an aircraft:

$$E_p = N \Sigma \left(\frac{\Delta e}{\Delta t}\right)_{m,p} \cdot (TIM)_m$$

On a conveniently laid out work sheet, this calculation can be set up easily on a hand calculator with one storage location.

Emission factors calculated in exactly this way are presented in Tables II- 1-9 and II- 1-10.

### References for Section II- 1

1. D. R. Sears, Air Pollutant Emission Factors for Military and Civil Aircraft, EPA-450/3-78-117, U.S. Environmental Protection Agency, Research Triangle Park, North Carolina, October 1978.

2. R. G. Pace, "Technical Support Report - Aircraft Emission Factors", Office of Mobile Source Air Pollution Control, U.S. Environmental Protection Agency, Ann Arbor, MI, March 1977.

3. Control of Air Pollution for Aircraft and Aircraft Engines, 38 FR 19088, July 17, 1973.

4. M. Platt, et al., The Potential Impact of Aircraft Emissions upon Air Quality, APTD-1085, U.S. Environmental Protection Agency, Research Triangle Park, NC, December 1971.

## II-2 Locomotives

II-2.1 General – Railroad locomotives generally follow one of two use patterns: railyard switching or road-haul service. Locomotives can be classified on the basis of engine configuration and use pattern into five categories: 2-stroke switch locomotive (supercharged), 4-stroke switch locomotive, 2-stroke road service locomotive (supercharged), 2-stroke road service locomotive (turbocharged), and 4-stroke road service locomotive.

The engine duty cycle of locomotives is much simpler than many other applications involving diesel internal combustion engines because locomotives usually have only eight throttle positions in addition to idle and dynamic brake. Emission testing is made easier and the results are probably quite accurate because of the simplicity of the locomotive duty cycle.

II-2.2 Emissions – Emissions from railroad locomotives are presented two ways in this section. Table II-2-1 contains average factors based on the nationwide locomotive population breakdown by category. Table II-2-2 gives emission factors by locomotive category on the basis of fuel consumption and on the basis of work output (horsepower hour).

The calculation of emissions using fuel-based emission factors is straightforward. Emissions are simply the product of the fuel usage and the emission factor. In order to apply the work output emission factor, however, an

Table II-2-1. AVERAGE LOCOMOTIVE EMISSION FACTORS BASED ON NATIONWIDE STATISTICS[a]

| Pollutant | Average emissions[b] | |
|---|---|---|
| | $lb/10^3$ gal | $kg/10^3$ liter |
| Particulates[c] | 25 | 3.0 |
| Sulfur oxides[d] ($SO_x$ as $SO_2$) | 57 | 6.8 |
| Carbon monoxide | 130 | 16 |
| Hydrocarbons | 94 | 11 |
| Nitrogen oxides ($NO_x$ as $NO_2$) | 370 | 44 |
| Aldehydes (as HCHO) | 5.5 | 0.66 |
| Organic acids[c] | 7 | 0.84 |

[a] Reference 1.

[b] Based on emission data contained in Table II-2-2 and the breakdown of locomotive use by engine category in the United States in Reference 1.

[c] Data based on highway diesel data from Reference 2. No actual locomotive particulate test data are available.

[d] Based on a fuel sulfur content of 0.4 percent from Reference 3.

Table II-2-2. EMISSION FACTORS BY LOCOMOTIVE ENGINE CATEGORY[a]
EMISSION FACTOR RATING: B

| Pollutant | Engine category | | | | |
|---|---|---|---|---|---|
| | 2-Stroke supercharged switch | 4-Stroke switch | 2-Stroke supercharged road | 2-Stroke turbocharged road | 4-Stroke road |
| Carbon monoxide | | | | | |
| lb/$10^3$ gal | 84 | 380 | 66 | 160 | 180 |
| kg/$10^3$ liter | 10 | 46 | 7.9 | 19 | 22 |
| g/hphr | 3.9 | 13 | 1.8 | 4.0 | 4.1 |
| g/metric hphr | 3.9 | 13 | 1.8 | 4.0 | 4.1 |
| Hydrocarbon | | | | | |
| lb/$10^3$ gal | 190 | 146 | 148 | 28 | 99 |
| kg/$10^3$ liter | 23 | 17 | 18 | 3.4 | 12 |
| g/hphr | 8.9 | 5.0 | 4.0 | 0.70 | 2.2 |
| g/metric hphr | 8.9 | 5.0 | 4.0 | 0.70 | 2.2 |
| Nitrogen oxides ($NO_x$ as $NO_2$) | | | | | |
| lb/$10^3$ gal | 250 | 490 | 350 | 330 | 470 |
| kg/$10^3$ liter | 30 | 59 | 42 | 40 | 56 |
| g/hphr | 11 | 17 | 9.4 | 8.2 | 10 |
| g/metric hphr | 11 | 17 | 9.4 | 8.2 | 10 |

[a] Use average factors (Table II-2-1) for pollutants not listed in this table.

additional calculation is necessary. Horsepower hours can be obtained using the following equation:

$$w = l\,p\,h$$

where: w = Work output (horsepower hour)

l = Load factor (average power produced during operation divided by available power)

p = Available horsepower

h = Hours of usage at load factor (l)

After the work output has been determined, emissions are simply the product of the work output and the emission factor. An approximate load factor for a line-haul locomotive (road service) is 0.4; a typical switch engine load factor is approximately 0.06.[1]

## References for Section II-2

1. Hare, C.T. and K.J. Springer. Exhaust Emissions from Uncontrolled Vehicles and Related Equipment Using Internal Combustion Engines. Part 1. Locomotive Diesel Engines and Marine Counterparts. Final Report. Southwest Research Institute. San Antonio, Texas Prepared for the Environmental Protection Agency, Research Triangle Park, N.C., under Contract Number EHA 70-108. October 1972.

2. Young, T.C. Unpublished Data from the Engine Manufacturers Association. Chicago, Ill. May 1970.

3. Hanley, G.P. Exhaust Emission Information on Electro-Motive Railroad Locomotives and Diesel Engines. General Motors Corp. Warren, Mich. October 1971.

## II-3 Inboard-Powered Vessels

II-3.1 General – Vessels classified on the basis of use will generally fall into one of three categories: commercial, pleasure, or military. Although usage and population data on vessels are, as a rule, relatively scarce, information on commercial and military vessels is more readily available than data on pleasure craft. Information on military vessels is available in several study reports,[1-5] but data on pleasure craft are limited to sales-related facts and figures.[6-10]

Commercial vessel population and usage data have been further subdivided by a number of industrial and governmental researchers into waterway classifications[11-16] (for example, Great Lakes vessels, river vessels, and coastal vessels). The vessels operating in each of these waterway classes have similar characteristics such as size, weight, speed, commodities transported, engine design (external or internal combustion), fuel used, and distance traveled. The wide variation between classes, however, necessitates the separate assessment of each of the waterway classes with respect to air pollution.

Information on military vessels is available from both the U.S. Navy and the U.S. Coast Guard as a result of studies completed recently. The U.S. Navy has released several reports that summarize its air pollution assessment work.[3-5] Emission data have been collected in addition to vessel population and usage information. Extensive study of the air pollutant emissions from U.S. Coast Guard watercraft has been completed by the U.S. Department of Transportation. The results of this study are summarized in two reports.[1-2] The first report takes an in-depth look at population/usage of Coast Guard vessels. The second report, dealing with emission test results, forms the basis for the emission factors presented in this section for Coast Guard vessels as well as for non-military diesel vessels.

Although a large portion of the pleasure craft in the U.S. are powered by gasoline outboard motors (see section II-4 of this document), there are numerous larger pleasure craft that use inboard power either with or without "out-drive" (an outboard-like lower unit). Vessels falling into the inboard pleasure craft category utilize either Otto cycle (gasoline) or diesel cycle internal combustion engines. Engine horsepower varies appreciably from the small "auxiliary" engine used in sailboats to the larger diesels used in yachts.

### II-3.2 Emissions

*Commercial vessels.* Commercial vessels may emit air pollutants under two major modes of operation: underway and at dockside (auxiliary power).

Emissions underway are influenced by a great variety of factors including power source (steam or diesel), engine size (in kilowatts or horsepower), fuel used (coal, residual oil, or diesel oil), and operating speed and load. Commercial vessels operating within or near the geographic boundaries of the United States fall into one of the three categories of use discussed above (Great Lakes, rivers, coastline). Tables II-3-1 and II-3-2 contain emission information on commercial vessels falling into these three categories. Table II-3-3 presents emission factors for diesel marine engines at various operating modes on the basis of horsepower. These data are applicable to any vessel having a similar size engine, not just to commercial vessels.

Unless a ship receives auxiliary steam from dockside facilities, goes immediately into drydock, or is out of operation after arrival in port, she continues her emissions at dockside. Power must be made available for the ship's lighting, heating, pumps, refrigeration, ventilation, etc. A few steam ships use auxiliary engines (diesel) to supply power, but they generally operate one or more main boilers under reduced draft and lowered fuel rates–a very inefficient process. Motorships (ships powered by internal combustion engines) normally use diesel-powered generators to furnish auxiliary power.[17] Emissions from these diesel-powered generators may also be a source of underway emissions if they are used away from port. Emissions from auxiliary power systems, in terms of the

## Table II-3-1. AVERAGE EMISSION FACTORS FOR COMMERCIAL MOTORSHIPS BY WATERWAY CLASSIFICATION
## EMISSION FACTOR RATING: C

| Emissions[a] | Class[c] | | |
|---|---|---|---|
| | River | Great Lakes | Coastal |
| Sulfur oxides[b] | | | |
| ($SO_x$ as $SO_2$) | | | |
| kg/$10^3$ liter | 3.2 | 3.2 | 3.2 |
| lb/$10^3$ gal | 27 | 27 | 27 |
| Carbon monoxide | | | |
| kg/$10^3$ liter | 12 | 13 | 13 |
| lb/$10^3$ gal | 100 | 110 | 110 |
| Hydrocarbons | | | |
| kg/$10^3$ liter | 6.0 | 7.0 | 6.0 |
| lb/$10^3$ gal | 50 | 59 | 50 |
| Nitrogen oxides | | | |
| ($NO_x$ as $NO_2$) | | | |
| kg/$10^3$ liter | 33 | 31 | 32 |
| lb/$10^3$ gal | 280 | 260 | 270 |

[a] Expressed as function of fuel consumed (based on emission data from Reference 2 and population/usage data from References 11 through 16.

[b] Calculated, not measured. Based on 0.20 percent sulfur content fuel and density of 0.854 kg/liter (7.12 lb/gal) from Reference 17.

[c] Very approximate particulate emission factors from Reference 2 are 470 g/hr (1.04 lb/hr). The reference does not contain sufficient information to calculate fuel-based factors.

quantity of fuel consumed, are presented in Table II-3-4. In some instances, fuel quantities used may not be available, so calculation of emissions based on kilowatt hours (kWh) produced may be necessary. For operating loads in excess of zero percent, the mass emissions ($e_1$) in kilograms per hour (pounds per hour) are given by:

$$e_1 = kle_f \tag{1}$$

where: $k$ = a constant that relates fuel consumption to kilowatt hours.[2]

that is, $3.63 \times 10^{-4}$ 1000 liters fuel/kWh

or

$9.59 \times 10^{-5}$ 1000 gal fuel/kWh

$l$ = the load, kW

$e_f$ = the fuel-specific emission factor from Table 3.2.3-4, kg/$10^3$ liter (lb/$10^3$ gal)

### Table II-3-2. EMISSION FACTORS FOR COMMERCIAL STEAMSHIPS–ALL GEOGRAPHIC AREAS

### EMISSION FACTOR RATING: D

| Pollutant | Fuel and operating mode[a] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Residual oil[b] | | | | | | Distillate oil[b] | | | | | |
| | Hoteling | | Cruise | | Full | | Hoteling | | Cruise | | Full | |
| | kg/$10^3$ liter | lb/$10^3$ gal | kg/$10^3$ liter | lb/$10^3$ gal | kg/$10^3$ liter | lb/$10^3$ gal | kg/$10^3$ liter | lb/$10^3$ gal | kg/$10^3$ liter | lb/$10^3$ gal | kg/$10^3$ liter | lb/$10^3$ gal |
| Particulates[c] | 1.20[d] | 10.0[d] | 2.40 | 20.0 | 6.78 | 56.5 | 1.8 | 15 | 1.78 | 15 | 1.78 | 15 |
| Sulfur oxides ($SO_x$ as $SO_2$)[e] | 19.1S | 159S | 19.1S | 159S | 19.1S | 159S | 17.0S | 142S | 17.0S | 142S | 17.0S | 142S |
| Carbon monoxide[c] | Neg[d] | Neg[d] | 0.414 | 3.45 | 0.872 | 7.27 | 0.5 | 4 | 0.5 | 4 | 0.5 | 4 |
| Hydrocarbons[c] | 0.38[d] | 3.2[d] | 0.082 | 0.682 | 0.206 | 1.72 | 0.4 | 3 | 0.4 | 3 | 0.4 | 3 |
| Nitrogen oxides ($NO_x$ as $NO_2$) | 4.37 | 36.4 | 6.70 | 55.8 | 7.63 | 63.6 | 2.66 | 22.2 | 2.83 | 23.6 | 5.34 | 44.5 |

[a] The operating modes are based on the percentage of maximum available power: "hoteling" is 10 to 11 percent of available power, "full" is 100 percent of available power, and "cruise" is an intermediate power (35 to 75 percent, depending on the test organization and vessel tested).

[b] Test organizations used "Navy Special" fuel oil, which is not a true residual oil. No vessel test data were available for residual oil combustion. "Residual" oil results are from References 2, 3, and 5. "Distillate" oil results are from References 3 and 5 only. Exceptions are noted. "Navy Distillate" was used as distillate test fuel.

[c] Particulate, carbon monoxide, and hydrocarbon emission factors for distillate oil combustion are based on stationary boilers (see Section 1.3 of this document).

[d] Reference 18 indicates that carbon monoxide emitted during hoteling is small enough to be considered negligible. This reference also places hydrocarbons at 0.38 kg/$10^3$ liter (3.2 lb/$10^3$ gal) and particulate at 1.20 kg/$10^3$ liter (10.0 lb/$10^3$ gal). These data are included for completeness only and are not necessarily comparable with other tabulated data.

[e] Emission factors listed are theoretical in that they are based on all the sulfur in the fuel converting to sulfur dioxide. Actual test data from References 3 and 5 confirm the validity of these theoretical factors. "S" is fuel sulfur content in percent.

### TableII-3-3. DIESEL VESSEL EMISSION FACTORS BY OPERATING MODE[a]
### EMISSION FACTOR RATING: C

| Horsepower | Mode | Emissions[b] | | | | | |
|---|---|---|---|---|---|---|---|
| | | Carbon monoxide | | Hydrocarbons | | Nitrogen oxides ($NO_x$ as $NO_2$) | |
| | | $lb/10^3$ gal | $kg/10^3$ liter | $lb/10^3$ gal | $kg/10^3$ liter | $lb/10^3$ gal | $kg/10^3$ liter |
| 200 | Idle | 210.3 | 25.2 | 391.2 | 46.9 | 6.4 | 0.8 |
| | Slow | 145.4 | 17.4 | 103.2 | 12.4 | 207.8 | 25.0 |
| | Cruise | 126.3 | 15.1 | 170.2 | 20.4 | 422.9 | 50.7 |
| | Full | 142.1 | 17.0 | 60.0 | 7.2 | 255.0 | 30.6 |
| 300 | Slow | 59.0 | 7.1 | 56.7 | 6.8 | 337.5 | 40.4 |
| | Cruise | 47.3 | 5.7 | 51.1 | 6.1 | 389.3 | 46.7 |
| | Full | 58.5 | 7.0 | 21.0 | 2.5 | 275.1 | 33.0 |
| 500 | Idle | 282.5 | 33.8 | 118.1 | 14.1 | 99.4 | 11.9 |
| | Cruise | 99.7 | 11.9 | 44.5 | 5.3 | 338.6 | 40.6 |
| | Full | 84.2 | 10.1 | 22.8 | 2.7 | 269.2 | 32.3 |
| 600 | Idle | 171.7 | 20.6 | 68.0 | 8.2 | 307.1 | 36.8 |
| | Slow | 50.8 | 6.1 | 16.6 | 2.0 | 251.5 | 30.1 |
| | Cruise | 77.6 | 9.3 | 24.1 | 2.9 | 349.2 | 41.8 |
| 700 | Idle | 293.2 | 35.1 | 95.8 | 11.5 | 246.0 | 29.5 |
| | Cruise | 36.0 | 4.3 | 8.8 | 1.1 | 452.8 | 54.2 |
| 900 | Idle | 223.7 | 26.8 | 249.1 | 29.8 | 107.5 | 12.9 |
| | 2/3 | 62.2 | 7.5 | 16.8 | 2.0 | 167.2 | 20.0 |
| | Cruise | 80.9 | 9.7 | 17.1 | 2.1 | 360.0 | 43.1 |
| | | | | | | | |
| 1580 | Slow | 122.4 | 14.7 | – | – | 371.3 | 44.5 |
| | Cruise | 44.6 | 5.3 | – | – | 623.1 | 74.6 |
| | Full | 237.7 | 28.5 | 16.8 | 2.0 | 472.0 | 5.7 |
| 2500 | Slow | 59.8 | 7.2 | 22.6 | 2.7 | 419.6 | 50.3 |
| | 2/3 | 126.5 | 15.2 | 14.7 | 1.8 | 326.2 | 39.1 |
| | Cruise | 78.3 | 9.4 | 16.8 | 2.0 | 391.7 | 46.9 |
| | Full | 95.0 | 11.5 | 21.3 | 2.6 | 399.6 | 47.9 |
| 3600 | Slow | 148.5 | 17.8 | 60.0 | 7.2 | 367.0 | 44.0 |
| | 2/3 | 28.1 | 3.4 | 25.4 | 3.0 | 358.6 | 43.0 |
| | Cruise | 41.4 | 5.0 | 32.8 | 4.0 | 339.6 | 40.7 |
| | Full | 62.4 | 7.5 | 29.5 | 3.5 | 307.0 | 36.8 |

[a] Reference 2.

[b] Particulate and sulfur oxides data are not available.

### Table II-3-4. AVERAGE EMISSION FACTORS FOR DIESEL-POWERED ELECTRICAL GENERATORS IN VESSELS[a]
### EMISSION FACTOR RATING: C

| Rated output,[b] kW | Load,[c] % rated output | Emissions | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Sulfur oxides ($SO_x$ as $SO_2$)[d] | | Carbon monoxide | | Hydrocarbons | | Nitrogen oxides ($NO_x$ as $NO_2$) | |
| | | lb/$10^3$ gal | kg/$10^3$ liter | lb/$10^3$ gal | kg/$10^3$ liter | lb/$10^3$ gal | kg/$10^3$ liter | lb/$10^3$ gal | kg/$10^3$ liter |
| 20 | 0 | 27 | 3.2 | 150 | 18.0 | 263 | 31.5 | 434 | 52.0 |
| | 25 | 27 | 3.2 | 79.7 | 9.55 | 204 | 24.4 | 444 | 53.2 |
| | 50 | 27 | 3.2 | 53.4 | 6.40 | 144 | 17.3 | 477 | 57.2 |
| | 75 | 27 | 3.2 | 28.5 | 3.42 | 84.7 | 10.2 | 495 | 59.3 |
| 40 | 0 | 27 | 3.2 | 153 | 18.3 | 584 | 70.0 | 214 | 25.6 |
| | 25 | 27 | 3.2 | 89.0 | 10.7 | 370 | 44.3 | 219 | 26.2 |
| | 50 | 27 | 3.2 | 67.6 | 8.10 | 285 | 34.2 | 226 | 27.1 |
| | 75 | 27 | 3.2 | 64.1 | 7.68 | 231 | 27.7 | 233 | 27.9 |
| 200 | 0 | 27 | 3.2 | 134 | 16.1 | 135 | 16.2 | 142 | 17.0 |
| | 25 | 27 | 3.2 | 97.9 | 11.7 | 33.5 | 4.01 | 141 | 16.9 |
| | 50 | 27 | 3.2 | 62.3 | 7.47 | 17.8 | 2.13 | 140 | 16.8 |
| | 75 | 27 | 3.2 | 26.7 | 3.20 | 17.5 | 2.10 | 137 | 16.4 |
| 500 | 0 | 27 | 3.2 | 58.4 | 7.00 | 209 | 25.0 | 153 | 18.3 |
| | 25 | 27 | 3.2 | 53.4 | 6.40 | 109 | 13.0 | 222 | 26.6 |
| | 50 | 27 | 3.2 | 48.1 | 5.76 | 81.9 | 9.8 | 293 | 35.1 |
| | 75 | 27 | 3.2 | 43.7 | 5.24 | 59.1 | 7.08 | 364 | 43.6 |

[a] Reference 2.

[b] Maximum rated output of the diesel-powered generator.

[c] Generator electrical output (for example, a 20 kW generator at 50 percent load equals 10 kW output).

[d] Calculated, not measured, based on 0.20 percent fuel sulfur content and density of 0.854 kg/liter (7.12 lb/gal) from Reference 17.

At zero load conditions, mass emission rates ($e_l$) may be approximated in terms of kg/hr (lb/hr) using the following relationship:

$$e_l = k l_{rated} e_f \tag{2}$$

where: $k$ = a constant that relates rated output and fuel consumption,

that is, $6.93 \times 10^{-5}$ 1000 liters fuel/kW

or

$1.83 \times 10^{-5}$ 1000 gal fuel/kW

$l_{rated}$ = the rated output, kW

$e_f$ = the fuel-specific emission factor from Table II-3-4, kg/$10^3$ liter (lb/$10^3$ gal)

*Pleasure craft.* Many of the engine designs used in inboard pleasure craft are also used either in military vessels (diesel) or in highway vehicles (gasoline). Out of a total of 700,000 inboard pleasure craft registered in the United States in 1972, nearly 300,000 were inboard/outdrive. According to sales data, 60 to 70 percent of these inboard/outdrive craft used gasoline-powered automotive engines rated at more than 130 horsepower.[6] The remaining 400,000 pleasure craft used conventional inboard drives that were powered by a variety of powerplants, both gasoline and diesel. Because emission data are not available for pleasure craft, Coast Guard and automotive data[2,19] are used to characterize emission factors for this class of vessels in Table II-3-5.

*Military vessels.* Military vessels are powered by a wide variety of both diesel and steam power plants. Many of the emission data used in this section are the result of emission testing programs conducted by the U.S. Navy and the U.S. Coast Guard.[1-3,5] A separate table containing data on military vessels is not provided here, but the included tables should be sufficient to calculate approximate military vessel emissions.

### TABLE II-3-5. AVERAGE EMISSION FACTORS FOR INBOARD PLEASURE CRAFT[a]

EMISSION FACTOR RATING: D

| | Based on fuel consumption | | | | Based on operating time | | | |
|---|---|---|---|---|---|---|---|---|
| | Diesel engine[b] | | Gasoline engine[c] | | Diesel engine[b] | | Gasoline engine[c] | |
| Pollutant | kg/$10^3$ liter | lb/$10^3$ gal | kg/$10^3$ liter | lb/$10^3$ gal | kg/hr | lb/hr | kg/hr | lb/hr |
| Sulfur oxides[d] ($SO_x$ as $SO_2$) | 3.2 | 27 | 0.77 | 6.4 | – | – | 0.008 | 0.019 |
| Carbon monoxide | 17 | 140 | 149 | 1240 | – | – | 1.69 | 3.73 |
| Hydrocarbons | 22 | 180 | 10.3 | 86 | – | – | 0.117 | 0.258 |
| Nitrogen oxides ($NO_x$ as $NO_2$) | 41 | 340 | 15.7 | 131 | – | – | 0.179 | 0.394 |

[a] Average emission factors are based on the duty cycle developed for large outboards (≥ 48 kilowatts or ≥ 65 horsepower) from Reference 7. The above factors take into account the impact of water scrubbing of underwater gasoline engine exhaust, also from Reference 7. All values given are for single engine craft and must be modified for multiple engine vessels.

[b] Based on tests of diesel engines in Coast Guard vessels, Reference 2.

[c] Based on tests of automotive engines, Reference 19. Fuel consumption of 11.4 liter/hr (3 gal/hr) assumed. The resulting factors are only *rough* estimates.

[d] Based on fuel sulfur content of 0.20 percent for diesel fuel and 0.043 percent for gasoline from References 7 and 17. Calculated using fuel density of 0.740 kg/liter (6.17 lb/gal) for gasoline and 0.854 kg/liter (7.12 lb/gal) for diesel fuel.

## References for Section II-3

1. Walter, R. A., A. J. Broderick, J. C. Sturm, and E. C. Klaubert. USCG Pollution Abatement Program: A Preliminary Study of Vessel and Boat Exhaust Emissions. U.S. Department of Transportation, Transportation Systems Center. Cambridge, Mass. Prepared for the United States Coast Guard. Washington, D.C. Report No. DOT-TSC-USCG-72-3. November 1971. 119 p.

2. Souza, A. F. A Study of Emissions from Coast Guard Cutters. Final Report. Scott Research Laboratories, Inc. Plumsteadville, Pa. Prepared for the Department of Transportation, Transportation Systems Center, Cambridge, Mass., under Contract No. DOT-TSC-429. February 1973.

3. Wallace, B. L. Evaluation of Developed Methodology for Shipboard Steam Generator Systems. Department of the Navy. Naval Ship Research and Development Center. Materials Department. Annapolis, Md. Report No. 28-463. March 1973. 18 p.

4. Waldron, A. L. Sampling of Emission Products from Ships' Boiler Stacks. Department of the Navy. Naval Ship Research and Development Center. Annapolis, Md. Report No. 28-169. April 1972. 7 p.

5. Foernsler, R. O. Naval Ship Systems Air Contamination Control and Environmental Data Base Programs; Progress Report. Department of the Navy. Naval Ship Research and Development Center. Annapolis, Md. Report No. 28-443. February 1973. 9 p.

6. The Boating Business 1972. The Boating Industry Magazine. Chicago, Ill. 1973.

7. Hare, C. T. and K. J. Springer. Exhaust Emissions from Uncontrolled Vehicles and Related Equipment Using Internal Combustion Engines. Final Report Part 2. Outboard Motors. Southwest Research Institute. San Antonio, Tex. Prepared for the Environmental Protection Agency, Research Triangle Park, N.C., under Contract No. EHS 70-108. January 1973. 57 p.

8. Hurst, J. W. 1974 Chrysler Gasoline Marine Engines. Chrysler Corporation. Detroit, Mich.

9. Mercruiser Sterndrives/ Inboards 73. Mercury Marine, Division of the Brunswick Corporation. Fond du Lac, Wisc. 1972.

10. Boating 1972. Marex. Chicago, Illinois, and the National Association of Engine and Boat Manufacturers. Greenwich, Conn. 1972. 8 p.

11. Transportation Lines on the Great Lakes System 1970. Transportation Series 3. Corps of Engineers, United States Army, Waterborne Commerce Statistics Center. New Orleans, La. 1970. 26 p.

12. Transportation Lines on the Mississippi and the Gulf Intracoastal Waterway 1970. Transportation Series 4. Corps of Engineers, United States Army, Waterborne Commerce Statistics Center. New Orleans, La. 1970. 232 p.

13. Transportation Lines on the Atlantic, Gulf and Pacific Coasts 1970. Transportation Series 5. Corps of Engineers. United States Army. Waterborne Commerce Statistics Center. New Orleans, La. 1970. 201 p.

14. Schueneman, J. J. Some Aspects of Marine Air Pollution Problems on the Great Lakes. J. Air Pol. Control Assoc. *14*:23-29, September 1964.

15. 1971 Inland Waterborne Commerce Statistics. The American Waterways Operations, Inc. Washington, D.C. October 1972. 38 p.

16. Horsepower on the Inland Waterways. List No. 23. The Waterways Journal. St. Louis, Mo. 1972. 2 p.

17. Hare, C. T. and K. J. Springer. Exhaust Emissions from Uncontrolled Vehicles and Related Equipment Using Internal Combustion Engines. Part 1. Locomotive Diesel Engines and Marine Counterparts. Southwest Research Institute. San Antonio, Tex. Prepared for the Environmental Protection Agency, Research Triangle Park, N.C., under Contract No. EHS 70-108. October 1972. 39 p.

18. Pearson, J. R. Ships as Sources of Emissions. Puget Sound Air Pollution Control Agency. Seattle, Wash. (Presented at the Annual Meeting of the Pacific Northwest International Section of the Air Pollution Control Association. Portland, Ore. November 1969.)

19. Study of Emissions from Light-Duty Vehicles in Six Cities. Automotive Environmental Systems, Inc. San Bernardino, Calif. Prepared for the Environmental Protection Agency, Research Triangle Park, N.C., under Contract No. 68-04-0042. June 1971.

## II-4 Outboard-Powered Vessels

II-4.1 General – Most of the approximately 7 million outboard motors in use in the United States are 2-stroke engines with an average available horsepower of about 25. Because of the predominately leisure-time use of outboard motors, emissions related to their operation occur primarily during nonworking hours, in rural areas, and during the three summer months. Nearly 40 percent of the outboards are operated in the states of New York, Texas, Florida, Michigan, California, and Minnesota. This distribution results in the concentration of a large portion of total nationwide outboard emissions in these states.[1]

II-4.2 Emissions – Because the vast majority of outboards have underwater exhaust, emission measurement is very difficult. The values presented in Table II-4-1 are the approximate atmospheric emissions from outboards. These data are based on tests of four outboard motors ranging from 4 to 65 horsepower.[1] The emission results from these motors are a composite based on the nationwide breakdown of outboards by horsepower. Emission factors are presented two ways in this section: in terms of fuel use and in terms of work output (horsepower hour). The selection of the factor used depends on the source inventory data available. Work output factors are used when the number of outboards in use is available. Fuel-specific emission factors are used when fuel consumption data are obtainable.

Table II-4-1. AVERAGE EMISSION FACTORS FOR OUTBOARD MOTORS[a]
EMISSION FACTOR RATING: B

| Pollutant[b] | Based on fuel consumption | | Based on work output[c] | |
|---|---|---|---|---|
| | lb/$10^3$ gal | kg/$10^3$ liter | g/hphr | g/metric hphr |
| Sulfur oxides[d] ($SO_x$ as $SO_2$) | 6.4 | 0.77 | 0.49 | 0.49 |
| Carbon monoxide | 3300 | 400 | 250 | 250 |
| Hydrocarbons[e] | 1100 | 130 | 85 | 85 |
| Nitrogen oxides ($NO_x$ as $NO_2$) | 6.6 | 0.79 | 0.50 | 0.50 |

[a] Reference 1. Data in this table are emissions to the atmosphere. A portion of the exhaust remains behind in the water.

[b] Particulate emission factors are not available because of the problems involved with measurement from an underwater exhaust system but are considered negligible.

[c] Horsepower hours are calculated by multiplying the average power produced during the hours of usage by the population of outboards in a given area. In the absence of data specific to a given geographic area, the hphr value can be estimated using average nationwide values from Reference 1. Reference 1 reports the average power produced (not the available power) as 9.1 hp and the average annual usage per engine as 50 hours. Thus, hphr = (number of outboards) (9.1 hp) (50 hours/outboard-year). Metric hphr = 0.9863 hphr.

[d] Based on fuel sulfur content of 0.043 percent from Reference 2 and on a density of 6.17 lb/gal.

[e] Includes exhaust hydrocarbons only. No crankcase emissions occur because the majority of outboards are 2-stroke engines that use crankcase induction. Evaporative emissions are limited by the widespread use of unvented tanks.

## References for sections II-4

1. Hare, C.T. and K.J. Springer. Exhaust Emissions from Uncontrolled Vehicles and Related Equipment Using Internal Combustion Engines. Part II, Outboard Motors. Final Report. Southwest Research Institute. San Antonio, Texas. Prepared for the Environmental Protection Agency, Research Triangle Park, N.C., under Contract Number EHS 70-108. January 1973.

2. Hare, C.T. and K.J. Springer. Study of Exhaust Emissions from Uncontrolled Vehicles and Related Equipment Using Internal Combustion Engines. Emission Factors and Impact Estimates for Light-Duty Air-Cooled Utility Engines and Motorcycles. Southwest Research Institute. San Antonio, Texas. Prepared for the Environmental Protection Agency, Research Triangle Park, N.C., under Contract Number EHS 70-108. January 1972.

## II-5 Small, General Utility Engines

II-5.1 General–This category of engines comprises small 2-stroke and 4-stroke, air-cooled, gasoline-powered motors. Examples of the uses of these engines are: lawnmowers, small electric generators, compressors, pumps, minibikes, snowthrowers, and garden tractors. This category does *not* include motorcycles, outboard motors, chain saws, and snowmobiles, which are either included in other parts of this chapter or are not included because of the lack of emission data.

Approximately 89 percent of the more than 44 million engines of this category in service in the United States are used in lawn and garden applications.[1]

II-5.2 Emissions–Emissions from these engines are reported in Table II-5-1. For the purpose of emission estimation, engines in this category have been divided into lawn and garden (2-stroke), lawn and garden (4-stroke), and miscellaneous (4-stroke). Emission factors are presented in terms of horsepower hours, annual usage, and fuel consumption.

### References for Section II-5

1. Donohue, J. A., G. C. Hardwick, H. K. Newhall, K. S. Sanvordenker, and N. C. Woelffer. Small Engine Exhaust Emissions and Air Quality in the United States. (Presented at the Automotive Engineering Congress, Society of Automotive Engineers, Detroit. January 1972.)

2. Hare, C. T. and K. J. Springer. Study of Exhaust Emissions from Uncontrolled Vehicles and Related Equipment Using Internal Combustion Engines. Part IV, Small Air-Cooled Spark Ignition Utility Engines. Final Report. Southwest Research Institute. San Antonio, Tex. Prepared for the Environmental Protection Agency, Research Triangle Park, N.C., under Contract No. EHS 70-108. May 1973.

## Table II-5-1. EMISSION FACTORS FOR SMALL, GENERAL UTILITY ENGINES[a,b]
## EMISSION FACTOR RATING: B

| Engine | Sulfur oxides[c] ($SO_x$ as $SO_2$) | Particulate | Carbon monoxide | Hydrocarbons |  | Nitrogen oxides ($NO_x$ as $NO_2$) | Aldehydes (HCHO) |
|---|---|---|---|---|---|---|---|
|  |  |  |  | Exhaust | Evaporative[d] |  |  |
| 2-Stroke, lawn and garden |  |  |  |  |  |  |  |
| g/hphr | 0.54 | 7.1 | 486 | 214 | – | 1.58 | 2.04 |
| g/metric hphr | 0.54 | 7.1 | 486 | 214 | – | 1.58 | 2.04 |
| g/gal of fuel | 1.80 | 23.6 | 1,618 | 713 | – | 5.26 | 6.79 |
| g/unit-year | 38 | 470 | 33,400 | 14,700 | 113 | 108 | 140 |
| 4-Stroke, lawn and garden |  |  |  |  |  |  |  |
| g/hphr | 0.37 | 0.44 | 279 | 23.2 | – | 3.17 | 0.49 |
| g/metric hphr | 0.37 | 0.44 | 279 | 23.2 | – | 3.17 | 0.49 |
| g/gal of fuel | 2.37 | 2.82 | 1,790 | 149 | – | 20.3 | 3.14 |
| g/unit-year | 26 | 31 | 19,100 | 1,590 | 113 | 217 | 34 |
| 4-Stroke miscellaneous |  |  |  |  |  |  |  |
| g/hphr | 0.39 | 0.44 | 250 | 15.2 | – | 4.97 | 0.47 |
| g/metric hphr | 0.39 | 0.44 | 250 | 15.2 | – | 4.97 | 0.47 |
| g/gal of fuel | 2.45 | 2.77 | 1,571 | 95.5 | – | 31.2 | 2.95 |
| g/unit-year | 30 | 34 | 19,300 | 1,170 | 290 | 384 | 36 |

[a] Reference 2.

[b] Values for g/unit-year were calculated assuming an annual usage of 50 hours and a 40 percent load factor. Factors for g/hphr can be used in instances where annual usages, load factors, and rated horsepower are known. Horsepower hours are the product of the usage in hours, the load factor, and the rated horsepower.

[c] Values calculated, not measured, based on the use of 0.043 percent sulfur content fuel.

[d] Values calculated from annual fuel consumption. Evaporative losses from storage and filling operations are not included (see Chapter 4).

## II-6 Agricultural Equipment

II-6.1 General – Farm equipment can be separated into two major categories: wheeled tractors and other farm machinery. In 1972, the wheeled tractor population on farms consisted of 4.5 million units with an average power of approximately 34 kilowatts (45 horsepower). Approximately 30 percent of the total population of these tractors is powered by diesel engines. The average diesel tractor is more powerful than the average gasoline tractor, that is, 52 kW (70 hp) versus 27 kW (36 hp).[1] A considerable amount of population and usage data is available for farm tractors. For example, the Census of Agriculture reports the number of tractors in use for each county in the U.S.[2] Few data are available on the usage and numbers of non-tractor farm equipment, however. Self-propelled combines, forage harvesters, irrigation pumps, and auxiliary engines on pull-type combines and balers are examples of non-tractor agricultural uses of internal combustion engines. Table II-6-1 presents data on this equipment for the U.S.

II-6.2 Emissions – Emission factors for wheeled tractors and other farm machinery are presented in Table II-6-2. Estimating emissions from the time-based emission factors–grams per hour (g/hr) and pounds per hour (lb/hr)–requires an average usage value in hours. An approximate figure of 550 hours per year may be used or, on the basis of power, the relationship, usage in hours = 450 + 5.24 (kW - 37.2) or usage in hours = 450 + 3.89 (hp - 50) may be employed.[1]

The best emissions estimates result from the use of "brake specific" emission factors (g/kWh or g/hphr). Emissions are the product of the brake specific emission factor, the usage in hours, the power available, and the load factor (power used divided by power available). Emissions are also reported in terms of fuel consumed.

Table II-6-1. SERVICE CHARACTERISTICS OF FARM EQUIPMENT (OTHER THAN TRACTORS)[a]

| Machine | Units in service, x$10^3$ | Typical size | Typical power | | Percent gasoline | Percent diesel |
|---|---|---|---|---|---|---|
| | | | kW | hp | | |
| Combine, self-propelled | 434 | 4.3 m<br>(14 ft) | 82 | 110 | 50 | 50 |
| Combine, pull type | 289 | 2.4 m<br>(8 ft) | 19 | 25 | 100 | 0 |
| Corn pickers and picker-shellers | 687 | 2-row | –[b] | – | – | – |
| Pick-up balers | 655 | 5400 kg/hr<br>(6 ton/hr) | 30 | 40 | 100 | 0 |
| Forage harvesters | 295 | 3.7 m<br>(12 ft) or<br>3-row | 104 | 140 | 0 | 100 |
| Miscellaneous | 1205 | – | 22 | 30 | 50 | 50 |

[a] Reference 1.

[b] Unpowered.

## TableII-6-2. EMISSION FACTORS FOR WHEELED FARM TRACTORS AND NON-TRACTOR AGRICULTURAL EQUIPMENT[a]

### EMISSION FACTOR RATING: C

| Pollutant | Diesel farm tractor | Gasoline farm tractor | Diesel farm equipment (non-tractor) | Gasoline farm equipment (non-tractor) |
|---|---|---|---|---|
| Carbon monoxide | | | | |
| g/hr | 161 | 3,380 | 95.2 | 4,360 |
| lb/hr | 0.355 | 7.46 | 0.210 | 9.62 |
| g/kWh | 4.48 | 192 | 5.47 | 292 |
| g/hphr | 3.34 | 143 | 4.08 | 218 |
| kg/$10^3$ liter | 14.3 | 391 | 16.7 | 492 |
| lb/$10^3$ gal | 119 | 3,260 | 139 | 4,100 |
| Exhaust hydrocarbons | | | | |
| g/hr | 77.8 | 128 | 38.6 | 143 |
| lb/hr | 0.172 | 0.282 | 0.085 | 0.315 |
| g/kWh | 2.28 | 7.36 | 2.25 | 9.63 |
| g/hphr | 1.70 | 5.49 | 1.68 | 7.18 |
| kg/$10^3$ liter | 7.28 | 15.0 | 6.85 | 16.2 |
| lb/$10^3$ gal | 60.7 | 125 | 57.1 | 135 |
| Crankcase hydrocarbons[b] | | | | |
| g/hr | – | 26.0 | – | 28.6 |
| lb/hr | – | 0.057 | – | 0.063 |
| g/kWh | – | 1.47 | – | 1.93 |
| g/hphr | – | 1.10 | – | 1.44 |
| kg/$10^3$ liter | – | 3.01 | – | 3.25 |
| lb/$10^3$ gal | – | 25.1 | – | 27.1 |
| Evaporative hydrocarbons[b] | | | | |
| g/unit-year | – | 15,600 | – | 1,600 |
| lb/unit-year | – | 34.4 | – | 3.53 |
| Nitrogen oxides ($NO_x$ as $NO_2$) | | | | |
| g/hr | 452 | 157 | 210 | 105 |
| lb/hr | 0.996 | 0.346 | 0.463 | 0.231 |
| g/kWh | 12.6 | 8.88 | 12.11 | 7.03 |
| g/hphr | 9.39 | 6.62 | 9.03 | 5.24 |
| kg/$10^3$ liter | 40.2 | 18.1 | 36.8 | 11.8 |
| lb/$10^3$ gal | 335 | 151 | 307 | 98.5 |
| Aldehydes (RCHO as HCHO) | | | | |
| g/hr | 16.3 | 7.07 | 7.23 | 4.76 |
| lb/hr | 0.036 | 0.016 | 0.016 | 0.010 |
| g/kWh | 0.456 | 0.402 | 0.402 | 0.295 |
| g/hphr | 0.340 | 0.300 | 0.30 | 0.220 |
| kg/$10^3$ liter | 1.45 | 0.821 | 1.22 | 0.497 |
| lb/$10^3$ gal | 12.1 | 6.84 | 10.2 | 4.14 |
| Sulfur oxides[c] ($SO_x$ as $SO_2$) | | | | |
| g/hr | 42.2 | 5.56 | 21.7 | 6.34 |
| lb/hr | 0.093 | 0.012 | 0.048 | 0.014 |

### Table II-6-2. (continued). EMISSION FACTORS FOR WHEELED FARM TRACTORS AND NON-TRACTOR AGRICULTURAL EQUIPMENT[a]
### EMISSION FACTOR RATING: C

| Pollutant | Diesel farm tractor | Gasoline farm tractor | Diesel farm equipment (non-tractor) | Gasoline farm equipment (non-tractor) |
|---|---|---|---|---|
| g/kWh | 1.17 | 0.312 | 1.23 | 0.377 |
| g/hphr | 0.874 | 0.233 | 0.916 | 0.281 |
| kg/$10^3$ liter | 3.74 | 0.637 | 3.73 | 0.634 |
| lb/$10^3$ gal | 31.2 | 5.31 | 31.1 | 5.28 |
| Particulate | | | | |
| g/hr | 61.8 | 8.33 | 34.9 | 7.94 |
| lb/hr | 0.136 | 0.018 | 0.077 | 0.017 |
| g/kWh | 1.72 | 0.471 | 2.02 | 0.489 |
| g/hphr | 1.28 | 0.361 | 1.51 | 0.365 |
| kg/$10^3$ liter | 5.48 | 0.960 | 6.16 | 0.823 |
| lb/$10^3$ gal | 45.7 | 8.00 | 51.3 | 6.86 |

[a] Reference 1.

[b] Crankcase and evaporative emissions from diesel engines are considered negligible.

[c] Not measured. Calculated from fuel sulfur content of 0.043 percent and 0.22 percent for gasoline-powered and diesel-powered equipment, respectively.

## References for Section II-6

1. Hare, C. T. and K. J. Springer. Exhaust Emissions from Uncontrolled Vehicles and Related Equipment Using Internal Combustion Engines. Final Report. Part 5: Heavy-Duty Farm, Construction and Industrial Engines. Southwest Research Institute, San Antonio, Tex. Prepared for Environmental Protection Agency, Research Triangle Park, N.C., under Contract No. EHS 70-108. August 1973. 97 p.

2. County Farm Reports. U.S. Census of Agriculture. U.S. Department of Agriculture. Washington, D.C.

## II-7 Heavy-Duty Construction Equipment

II-7.1 General - The useful life of construction equipment is fairly short because of the frequent and severe usage it must endure. The annual usage of the various categories of equipment considered here ranges from 740 hours (wheeled tractors and rollers) to 2000 hours (scrapers and off-highway trucks). This high level of use results in average vehicle lifetimes of only 6 to 16 years. The equipment categories in this section include: track type tractors, track type loaders, motor graders, wheel tractor scrapers, off-highway trucks (includes pavement cold planers and wheel dozers), wheeled loaders, wheeled tractors, rollers (static and vibratory), and miscellaneous machines. The latter category contains an array of less numerous mobile and semi-mobile machines used in construction such as log skidders, hydraulic excavators/crawlers, trenchers, concrete pavers, compact loaders, crane lattice booms, cranes, hydraulic excavator wheels, and bituminous pavers. Some of these categories are different from the Third Edition.

II-7.2 Emissions - Recently, Environmental Research and Technology, Inc. prepared a report[3] under the sponsorship of a consortium of industry groups. This report, referred to as the CAL/ERT report, provided a very comprehensive investigation of farm construction and industrial equipment emissions. The emissions of twenty different types of construction equipments are grouped roughly according to the categories in the Third Edition by their populations in California (based on a report prepared by the California Air Resources Board[4]). The updated emission factors on $HC/CO/NO_x$ for heavy-duty construction equipment for diesel engines are reported in Table II-7.1. No update has been done on other emissions (aldehydes, sulfur oxides, and particulates), and their values are carried over from the Third Edition. Less than five percent of the sales use gasoline engines, and the trend is toward complete dieselization. No update has been done on the gasoline engine construction equipment emissions. Therefore, the emission factors for gasoline engines from the Third Edition are reprinted in Table II-7.2. The factors are reported in three different forms-on the basis of running time, fuel consumed, and power consumed.

In order to estimate emissions from time-based emission factors, annual equipment usage in hours must be estimated. The following estimates of use for the equipment listed in the tables should permit reasonable emission calculations.

| Category | Annual operation, hours/year |
|---|---|
| Tracklaying tractors | 1050 |
| Tracklaying shovel loaders | 1100 |
| Motor graders | 830 |
| Scrapers | 2000 |
| Off-highway trucks | 4000 |
| (including wheeled dozers) | 2000 |
| Wheeled loaders | 1140 |
| Wheeled tractors | 740 |
| Rollers | 740 |
| Miscellaneous | 1000 |

The best method for calculating emissions, however, is on the basis of "brake specific" emission factors (g/kWh or g/hphr). Emissions are calculated by taking the product of the brake specific emission factor, the usage in hours, the power available (that is, rated power), and the load factor (the power actually used divided by the power available).

## References for Section II-7

1. Hare, C.T. and K.J. Springer. Exhaust Emissions from Uncontrolled Vehicles and Related Equipment Using Internal Combustion Engines-Final Report. Part 5: Heavy-Duty Farm, Construction, and Industrial Engines. Southwest Research Institute, San Antonio, Tex. Prepared for Environmental Protection Agency, Research Triangle Park, N.C., under Contract No. EHS 70-108. October 1973. 105p.

2. Hare, C.T. Letter to C.C. Masser of Environmental Protection Agency, Research Triangle Park, N.C., concerning fuel-based emission rates for farm, construction, and industrial engines. San Antonio, Tex. January 14, 1974. 4p.

3. Ingalls, Melvin N. Recommended Revisions to Gaseous Emission Factors from Several Classes of Off-Highway Mobile Sources--Final Report. Southwest Research Institute, San Antonio, Texas. Prepared for Environmental Protection Agency, Office of Mobile Source Air Pollution Control, Ann Arbor, MI., under Contract NO. 68-03-3162 September 1984.

4. State of California Air Resources Board. Status Report: Emissions Inventory on Non-Farm (MS-1), Farm (MS-2), and Lawn and Garden (Utility) (MS-3) Equipment. July 1983. 87p.

Table II-7.1 Emission Factors for Heavy-Duty, Diesel-Powered Construction Equipment[a]
Emission Factor Rating: C

| Pollutant | Track-type tractor | Wheeled tractor | Wheeled dozer[b] | Scraper | Motor grader |
|---|---|---|---|---|---|
| CARBON MONOXIDE | | | | | |
| g/hr | 157.01 | 1622.77 | | 568.19 | 68.46 |
| lb/hr | 0.346 | 3.59 | | 1.257 | 0.151 |
| g/kWh | 2.88 | 9.84 | | 3.28 | 2.06 |
| g/hphr | 2.15 | 7.34 | | 2.45 | 1.54 |
| $kg/10^3$ liter | 9.4 | 32.19 | | 10.16 | 6.55 |
| $lb/10^3$ gal | 78.5 | 268.5 | | 84.6 | 54.65 |
| EXHAUST HYDROCARBONS | | | | | |
| g/hr | 55.06 | 85.26 | | 128.15 | 18.07 |
| lb/hr | 0.121 | 0.188 | | 0.282 | 0.040 |
| g/kWh | 1.01 | 2.36 | | 0.74 | 0.48 |
| g/hphr | 0.75 | 1.76 | | 0.55 | 0.36 |
| $kg/10^3$ liter | 3.31 | 7.74 | | 2.28 | 1.53 |
| $lb/10^3$ gal | 27.6 | 64.6 | | 19.0 | 12.73 |
| NITROGEN OXIDES ($NO_x$ as $NO_2$) | | | | | |
| g/hr | 570.70 | 575.84 | | 1740.74 | 324.43 |
| lb/hr | 1.26 | 1.269 | | 3.840 | 0.713 |
| g/kWh | 10.47 | 15.96 | | 10.00 | 9.57 |
| g/hphr | 7.81 | 11.91 | | 7.46 | 7.14 |
| $kg/10^3$ liter | 34.16 | 52.35 | | 30.99 | 30.41 |
| $lb/10^3$ gal | 284.92 | 436.67 | | 258.6 | 253.84 |
| ALDEHYDES (RCHO as HCHO) | | | | | |
| g/hr | 12.4 | 13.5 | 29.5 | 65. | 5.54 |
| lb/hr | 0.027 | 0.030 | 0.065 | 0.143 | 0.012 |
| g/kWh | 0.228 | 0.378 | 0.215 | 0.375 | 0.162 |
| g/hphr | 0.170 | 0.282 | 0.160 | 0.280 | 0.121 |
| $kg/10^3$ liter | 0.745 | 1.23 | 0.690 | 1.16 | 0.517 |
| $lb/10^3$ gal | 6.22 | 10.3 | 5.76 | 9.69 | 4.31 |
| SULFUR OXIDES ($SO_x$ as $SO_2$) | | | | | |
| g/hr | 62.3 | 40.9 | 158. | 210. | 39.0 |
| lb/hr | 0.137 | 0.090 | 0.348 | 0.463 | 0.086 |
| g/kWh | 1.14 | 1.14 | 1.16 | 1.21 | 1.17 |
| g/hphr | 0.851 | 0.851 | 0.867 | 0.901 | 0.874 |
| $kg/10^3$ liter | 3.73 | 3.73 | 3.74 | 3.74 | 3.73 |
| $lb/10^3$ gal | 31.1 | 31.1 | 31.2 | 31.2 | 31.1 |
| PARTICULATE | | | | | |
| g/hr | 50.7 | 61.5 | 75. | 184. | 27.7 |
| lb/hr | 0.112 | 0.136 | 0.165 | 0.406 | 0.061 |
| g/kWh | 0.928 | 1.70 | 0.551 | 1.06 | 0.838 |
| g/hphr | 0.692 | 1.27 | 0.411 | 0.789 | 0.625 |
| $kg/10^3$ liter | 3.03 | 5.57 | 1.77 | 3.27 | 2.66 |
| $lb/10^3$ gal | 25.3 | 46.5 | 14.8 | 27.3 | 22.2 |

[a] References 3 and 4 for the HC/CO/$NO_x$ emissions, and references 1 and 2 for other emissions.

[b] The wheeled dozer HC/CO/$NO_x$ emissions are included in the off-highway truck category.

## Table II-7.1 (cont'd) Emission Factors for Heavy-Duty Diesel-Powered Construction Equipment[a]

Emission Factor Rating: C

| Pollutant | Wheeled loader | Tracktype loader | Off-Highway truck[b] | Roller | Miscellaneous |
|---|---|---|---|---|---|
| CARBON MONOXIDE | | | | | |
| g/hr | 259.58 | 91.15 | 816.81 | 137.97 | 306.37 |
| lb/hr | 0.572 | 0.201 | 1.794 | 0.304 | 0.675 |
| g/kWh | 3.63 | 3.03 | 4.70 | 8.08 | 6.16 |
| g/hphr | 2.71 | 2.26 | 2.28 | 6.03 | 4.60 |
| kg/$10^3$ liter | 11.79 | 9.93 | 14.73 | 22.64 | 18.41 |
| lb/$10^3$ gal | 98.66 | 82.85 | 123.46 | 188.37 | 153.51 |
| EXHAUST HYDROCARBONS | | | | | |
| g/hr | 113.17 | 44.55 | 86.84 | 30.58 | 69.35 |
| lb/hr | 0.25 | 0.098 | 0.192 | 0.067 | 0.152 |
| g/kWh | 1.59 | 1.49 | 0.50 | 1.30 | 1.35 |
| g/hphr | 0.97 | 1.11 | 0.37 | 0.97 | 1.01 |
| kg/$10^3$ liter | 5.17 | 4.85 | 1.58 | 3.60 | 4.04 |
| lb/$10^3$ gal | 43.16 | 40.55 | 13.16 | 30.09 | 33.70 |
| NITROGEN OXIDES ($NO_x$ as $NO_2$) | | | | | |
| g/hr | 858.19 | 375.22 | 1889.16 | 392.90 | 767.30 |
| lb/hr | 1.89 | 0.827 | 4.166 | 0.862 | 1.691 |
| g/kWh | 11.81 | 12.46 | 10.92 | 17.49 | 14.75 |
| g/hphr | 8.81 | 9.30 | 8.15 | 13.05 | 11.01 |
| kg/$10^3$ liter | 38.5 | 40.78 | 34.29 | 48.49 | 44.10 |
| lb/$10^3$ gal | 321.23 | 339.82 | 286.10 | 404.51 | 368.01 |
| ALDEHYDES (RCHO as HCHO) | | | | | |
| g/hr | 18.8 | 4.00 | 51.0 | 7.43 | 13.9 |
| lb/hr | 0.041 | 0.009 | 0.112 | 0.016 | 0.031 |
| g/kWh | 0.264 | 0.134 | 0.295 | 0.263 | 0.272 |
| g/hphr | 0.197 | 0.100 | 0.220 | 0.196 | 0.203 |
| kg/$10^3$ liter | 0.859 | 0.439 | 0.928 | 0.731 | 0.813 |
| lb/$10^3$ gal | 7.17 | 3.66 | 7.74 | 6.10 | 6.78 |
| SULFUR OXIDES ($SO_x$ as $SO_2$) | | | | | |
| g/hr | 82.5 | 34.4 | 206. | 30.5 | 64.7 |
| lb/hr | 0.182 | 0.076 | 0.454 | 0.067 | 0.143 |
| g/kWh | 1.15 | 1.14 | 1.19 | 1.34 | 1.25 |
| g/hphr | 0.857 | 0.853 | 0.887 | 1.00 | 0.932 |
| kg/$10^3$ liter | 3.74 | 3.74 | 3.74 | 3.73 | 3.73 |
| lb/$10^3$ gal | 31.2 | 31.2 | 31.2 | 31.1 | 31.1 |
| PARTICULATE | | | | | |
| g/hr | 77.9 | 26.4 | 116. | 22.7 | 63.2 |
| lb/hr | 0.172 | 0.058 | 0.256 | 0.050 | 0.139 |
| g/kWh | 1.08 | 0.878 | 0.673 | 1.04 | 1.21 |
| g/hphr | 0.805 | 0.655 | 0.502 | 0.778 | 0.902 |
| kg/$10^3$ liter | 3.51 | 2.88 | 2.12 | 2.90 | 3.61 |
| lb/$10^3$ gal | 29.3 | 24.0 | 17.7 | 24.2 | 30.1 |

[a] References 3 and 4 for the HC/CO/$NO_x$ emissions and references 1 and 2 for other emissions.

[b] The off-highway truck category incudes HC/CO/$NO_x$ emissions from the wheeled dozer.

### Table II-7.2 Emission Factors for Heavy-Duty, Gasoline-Powered Construction Equipment[a]

Emission Factor Rating: C

| Pollutant | Wheeled tractor | Motor grader | Wheeled loader | Roller | Miscellaneous |
|---|---|---|---|---|---|
| CARBON MONOXIDE | | | | | |
| g/hr | 4320. | 5490. | 7060. | 6080. | 7720. |
| lb/hr | 9.52 | 12.1 | 15.6 | 13.4 | 17.0 |
| g/kWh | 190. | 251. | 219. | 271. | 266. |
| g/hphr | 142. | 187. | 163. | 202 | 198. |
| kg/$10^3$ liter | 389. | 469. | 435. | 460. | 475. |
| lb/$10^3$ gal | 3250. | 3910. | 3630. | 3840. | 3960. |
| EXHAUST HYDROCARBONS | | | | | |
| g/hr | 164. | 186. | 241. | 277. | 254. |
| lb/hr | 0.362 | 0.410 | 0.531 | 0.611 | 0.560 |
| g/kWh | 7.16 | 8.48 | 7.46 | 12.40 | 8.70 |
| g/hphr | 5.34 | 6.32 | 5.56 | 9.25 | 6.49 |
| kg/$10^3$ liter | 14.6 | 15.8 | 14.9 | 21.1 | 15.6 |
| lb/$10^3$ gal | 122. | 132. | 124. | 176. | 130. |
| EVAPORATIVE HYDROCARBONS[b] | | | | | |
| g/hr | 30.9 | 30.0 | 29.7 | 28.2 | 25.4 |
| lb/hr | 0.0681 | 0.0661 | 0.0655 | 0.0622 | 0.0560 |
| CRANKCASE HYDROCARBONS[b] | | | | | |
| g/hr | 32.6 | 37.1 | 48.2 | 55.5 | 50.7 |
| lb/hr | 0.0719 | 0.0818 | 0.106 | 0.122 | 0.112 |
| NITROGEN OXIDES ($NO_x$ as $NO_2$) | | | | | |
| g/hr | 195. | 145. | 235. | 164. | 187. |
| lb/hr | 0.430 | 0.320 | 0.518 | 0.362 | 0.412 |
| g/kWh | 8.54 | 6.57 | 7.27 | 7.08 | 6.48 |
| g/hphr | 6.37 | 4.90 | 5.42 | 5.28 | 4.79 |
| kg/$10^3$ liter | 17.5 | 12.2 | 14.5 | 12.0 | 11.5 |
| lb/$10^3$ gal | 146. | 102. | 121. | 100. | 95.8 |
| ALDEHYDES (RCHO as HCHO) | | | | | |
| g/hr | 7.97 | 8.80 | 9.65 | 7.57 | 9.00 |
| lb/hr | 0.0176 | 0.0194 | 0.0213 | 0.0167 | 0.0198 |
| 0.0198 | | | | | |
| g/kWh | 0.341 | 0.386 | 0.298 | 0.343 | 0.298 |
| g/hphr | 0.254 | 0.288 | 0.222 | 0.256 | 0.222 |
| kg/$10^3$ liter | 0.697 | 0.721 | 0.593 | 0.582 | 0.532 |
| lb/$10^3$ gal | 5.82 | 6.02 | 4.95 | 4.86 | 4.44 |
| SULFUR OXIDES ($SO_x$ as $SO_2$) | | | | | |
| g/hr | 7.03 | 7.59 | 10.6 | 8.38 | 10.6 |
| lb/hr | 0.0155 | 0.0167 | 0.0234 | 0.0185 | 0.0234 |
| g/kWh | 0.304 | 0.341 | 0.319 | 0.373 | 0.354 |
| g/hphr | 0.227 | 0.254 | 0.238 | 0.278 | 0.264 |
| kg/$10^3$ liter | 0.623 | 0.636 | 0.636 | 0.633 | 0.633 |
| lb/$10^3$ gal | 5.20 | 5.31 | 5.31 | 5.28 | 5.28 |

Table II-7.2 (cont'd) Emission Factors for Heavy-Duty,
Gasoline-Powered
Construction Equipment[a]
Emission Factor Rating: C

| Pollutant | Wheeled tractor | Motor grader | Wheeled loader | Roller | Miscel-laneous |
|---|---|---|---|---|---|
| PARTICULATE | | | | | |
| g/hr | 10.9 | 9.40 | 13.5 | 11.8 | 11.7 |
| lb/hr | 0.0240 | 0.0207 | 0.0298 | 0.0260 | 0.0258 |
| g/kWh | 0.484 | 0.440 | 0.421 | 0.527 | 0.406 |
| g/hphr | 0.361 | 0.328 | 0.314 | 0.393 | 0.303 |
| kg/$10^3$ liter | 0.991 | 0.822 | 0.839 | 0.895 | 0.726 |
| lb/$10^3$ gal | 8.27 | 6.86 | 7.00 | 7.47 | 6.06 |

[a] References 1 and 2.

[b] Evaporative and crankcase hydrocarbons based on operating time only (Reference 1).

## II-8 Snowmobiles

II-8.1 General – In order to develop emission factors for snowmobiles, mass emission rates must be known, and operating cycles representative of usage in the field must be either known or assumed. Extending the applicability of data from tests of a few vehicles to the total snowmobile population requires additional information on the composition of the vehicle population by engine size and type. In addition, data on annual usage and total machine population are necessary when the effect of this source on national emission levels is estimated.

An accurate determination of the number of snowmobiles in use is quite easily obtained because most states require registration of the vehicles. The most notable features of these registration data are that almost 1.5 million sleds are operated in the United States, that more than 70 percent of the snowmobiles are registered in just four states (Michigan, Minnesota, Wisconsin, and New York), and that only about 12 percent of all snowmobiles are found in areas outside the northeast and northern midwest.

II-8.2 Emissions – Operating data on snowmobiles are somewhat limited, but enough are available so that an attempt can be made to construct a representative operating cycle. The required end products of this effort are time-based weighting factors for the speed/load conditions at which the test engines were operated; use of these factors will permit computation of "cycle composite" mass emissions, power consumption, fuel consumption, and specific pollutant emissions.

Emission factors for snowmobiles were obtained through an EPA-contracted study[1] in which a variety of snowmobile engines were tested to obtain exhaust emissions data. These emissions data along with annual usage data were used by the contractor to estimate emission factors and the nationwide emission impact of this pollutant source.

To arrive at average emission factors for snowmobiles, a reasonable estimate of average engine size was necessary. Weighting the size of the engine to the degree to which each engine is assumed to be representative of the total population of engines in service resulted in an estimated average displacement of 362 cubic centimeters ($cm^3$).

The speed/load conditions at which the test engines were operated represented, as closely as possible, the normal operation of snowmobiles in the field. Calculations using the fuel consumption data obtained during the tests and the previously approximated average displacement of 362 $cm^3$ resulted in an estimated average fuel consumption of 0.94 gal/hr.

To compute snowmobile emission factors on a gram per unit year basis, it is necessary to know not only the emission factors but also the annual operating time. Estimates of this usage are discussed in Reference 1. On a national basis, however, average snowmobile usage can be assumed to be 60 hours per year. Emission factors for snowmobiles are presented in Table II-8-1.

### References for Section II-8

1. Hare, C. T. and K. J. Springer. Study of Exhaust Emissions from Uncontrolled Vehicles and Related Equipment Using Internal Combustion Engines. Final Report. Part 7: Snowmobiles. Southwest Research Institute, San Antonio, Tex. Prepared for Environmental Protection Agency, Research Triangle Park, N.C., under Contract No. EHS 70-108. April 1974.

### Table II-8-1. EMISSION FACTORS FOR SNOWMOBILES
### EMISSION FACTOR RATING: B

| Pollutant | Emissions | | | |
|---|---|---|---|---|
| | g/unit-year[a] | g/gal[b] | g/liter[b] | g/hr[b] |
| Carbon monoxide | 58,700 | 1,040. | 275. | 978. |
| Hydrocarbons | 37,800 | 670. | 177. | 630. |
| Nitrogen oxides | 600 | 10.6 | 2.8 | 10.0 |
| Sulfur oxides[c] | 51 | 0.90 | 0.24 | 0.85 |
| Solid particulate | 1,670 | 29.7 | 7.85 | 27.9 |
| Aldehydes (RCHO) | 552 | 9.8 | 2.6 | 9.2 |

[a] Based on 60 hours of operation per year and 362 $cm^3$ displacement.

[b] Based on 362 $cm^3$ displacement and average fuel consumption of 0.94 gal/hr.

[c] Based on sulfur content of 0.043 percent by weight.

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